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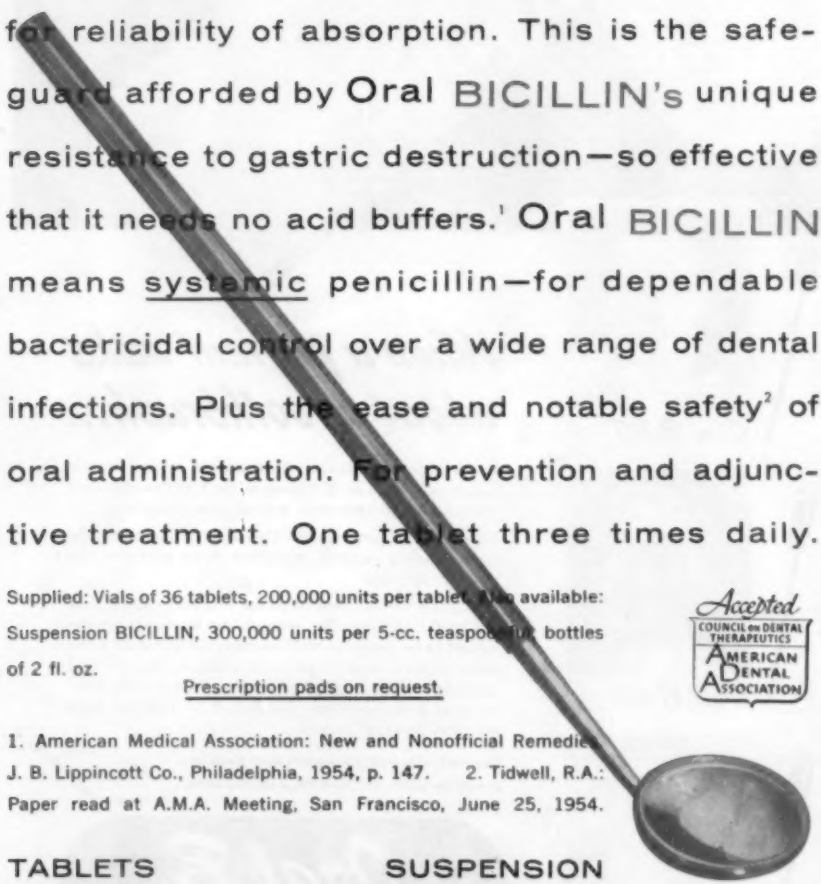

1. American Medical Association: New and Nonofficial Remedies, J. B. Lippincott Co., Philadelphia, 1954, p. 147. 2. Tidwell, R.A.: Paper read at A.M.A. Meeting, San Francisco, June 25, 1954.

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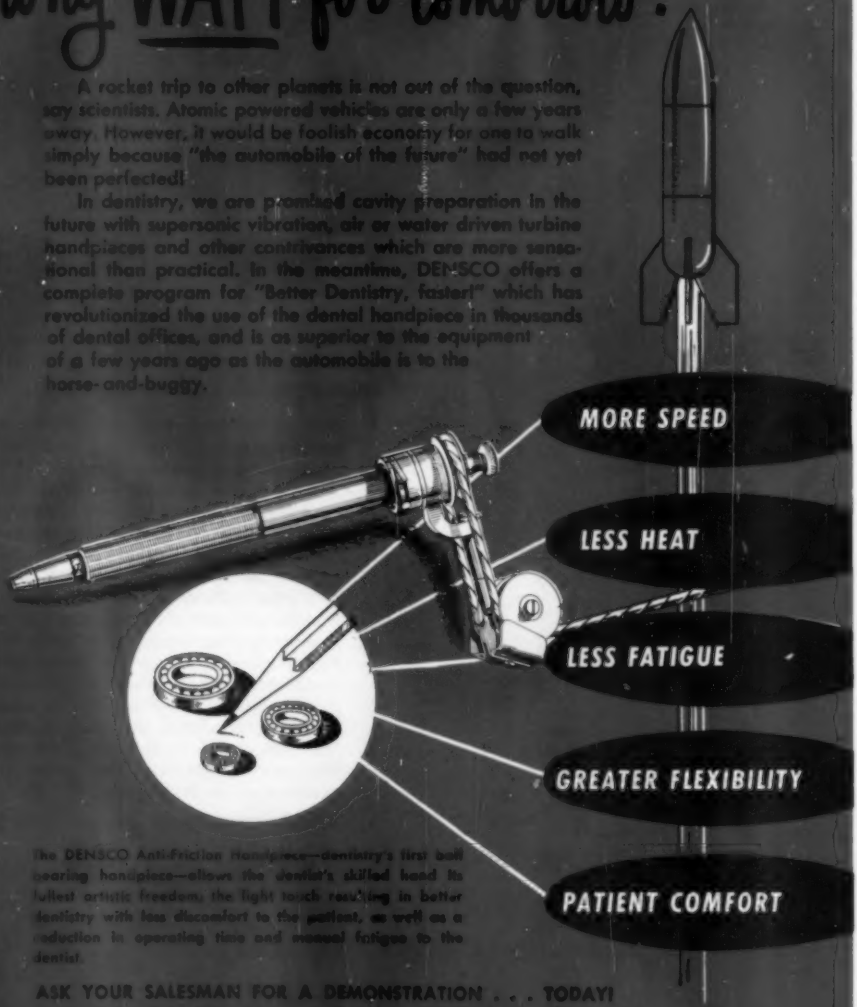

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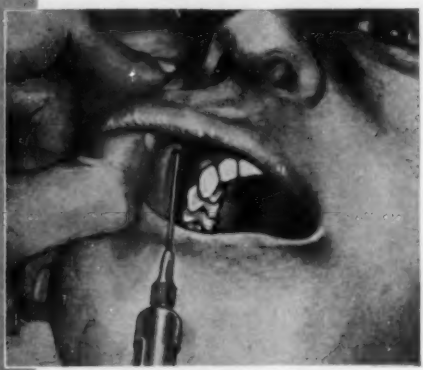

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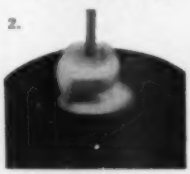
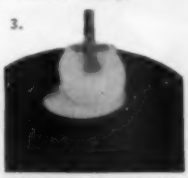


Pin embedded in Kadon filling.

3.



Cross section. No undercuts, for test purposes. Bulbous end of pin securely embedded in Kadon. Upward pull extracts filling.

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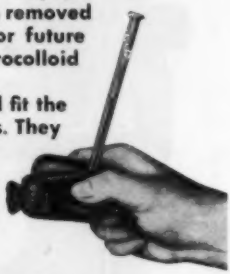

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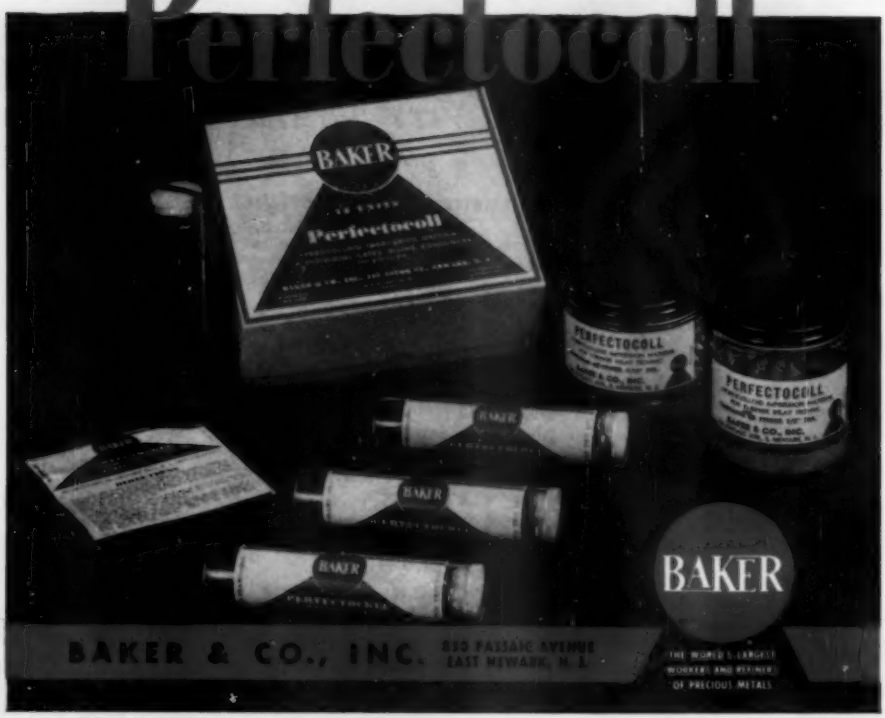

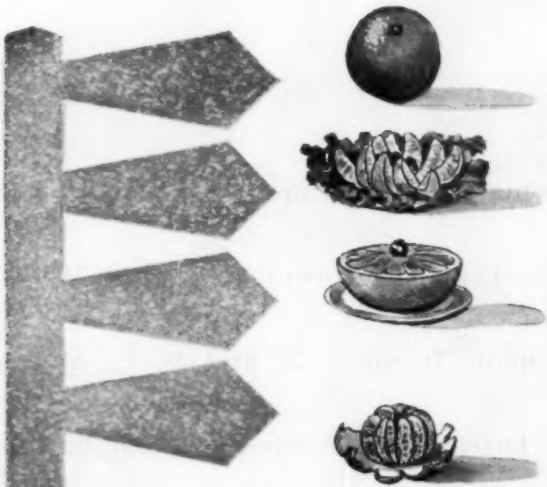

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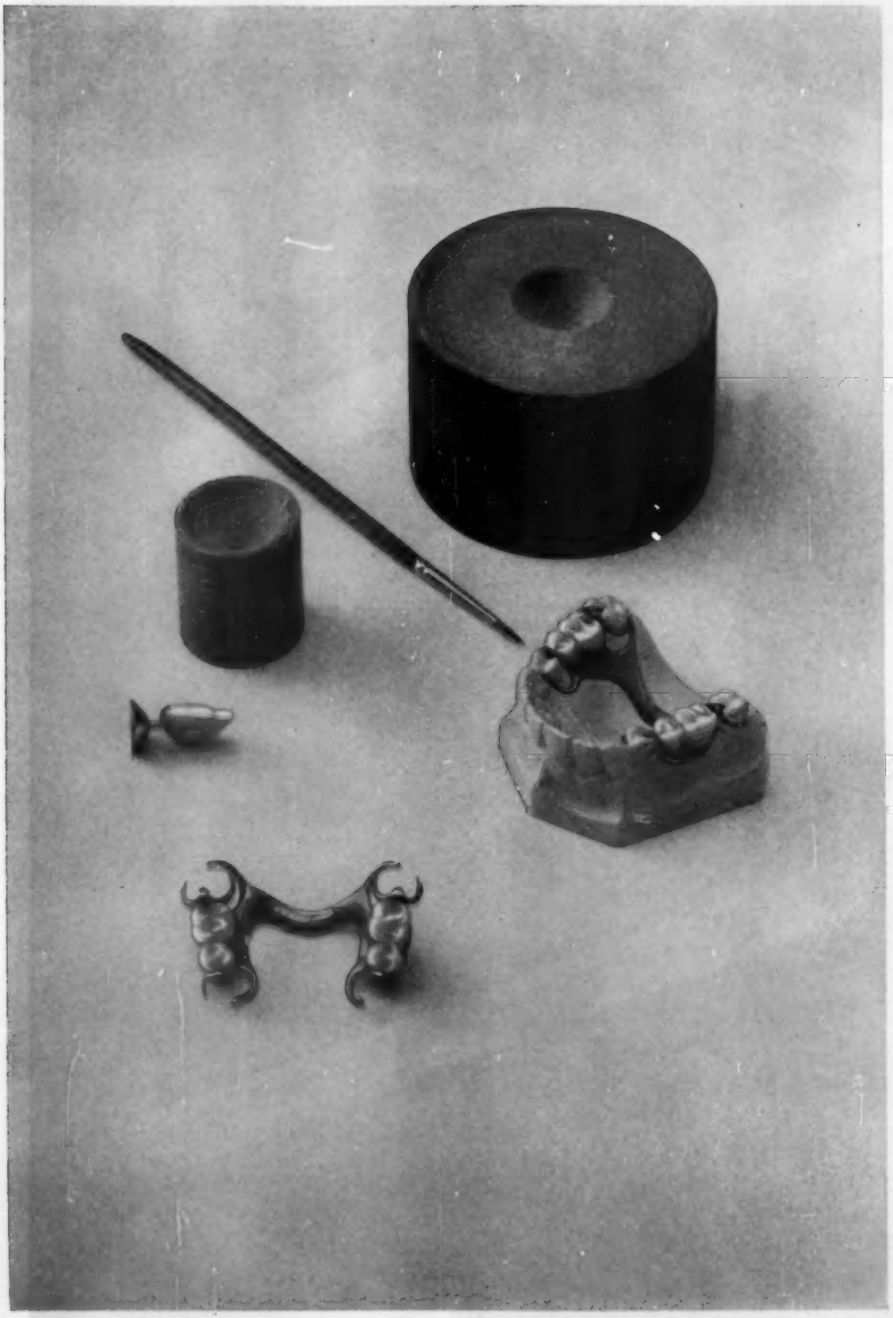

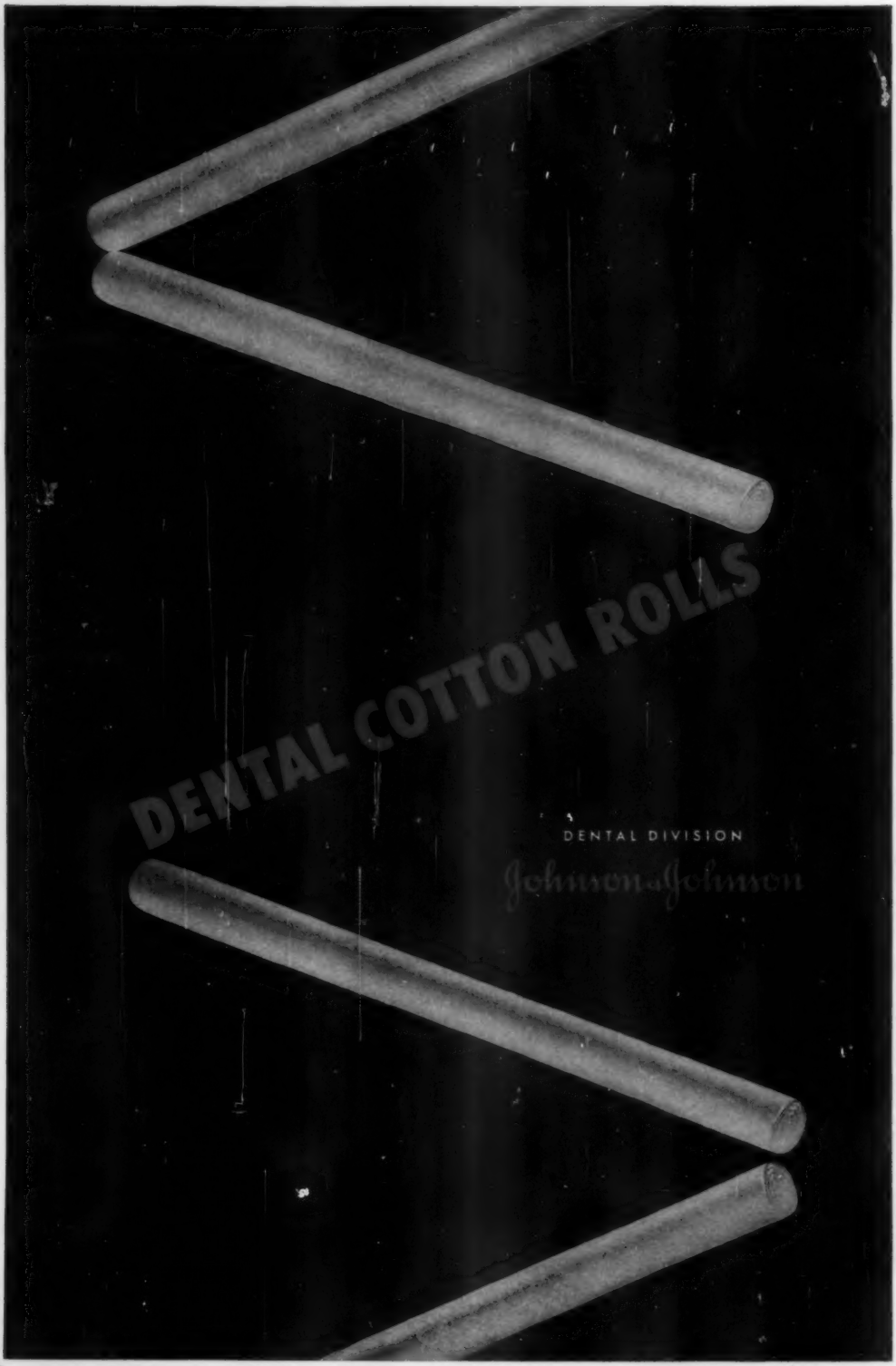
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VOLUME 50 • NUMBER 1

Reproducibility of gold castings made by present day dental casting technics

L. W. Suffert, D.D.S., Porto Alegre, Brazil, and*
D. B. Mahler,† M.S., Ann Arbor, Mich.

One of the most significant requirements which a cast gold restoration must satisfy is an extremely close fit to the walls of the cavity preparation. If this requirement is met, the result will be successful retention of the restoration and prevention of further pathological involvements, provided that all other factors are equal. A basic function of the gold casting process, therefore, is to satisfy this requirement.

Numerous articles on dental gold castings have appeared in dental periodical literature, and many of the authors are extremely optimistic about the high degree of accuracy obtainable through the use of one or another casting technic. No mention is made of difficulties encountered in the reproducing of this accuracy. There is evidence, however, that the average dentist has difficulty in obtaining the same degree of fit of the casting each time a cast gold restoration is required. This difficulty may result from nonadherence to the basic principles of the dental gold casting procedure, or perhaps from some inherent deficiencies in the present day casting technics. Since the factor of incompetent procedure has been investigated thoroughly, it was decided to investigate the possible deficiencies in the casting procedure.

Specifically, then, the purpose of this study was to determine the reproducibility of gold castings made by four different dental casting technics.

EXPERIMENTAL METHOD

The most obvious and the simplest method of evaluating a dental casting is to try the casting back on the die. This

These studies were aided in part by a contract between the Office of Naval Research, Department of the Navy, and the University of Michigan, NR 180 360.

*Instructor, department of dental materials, School of Dentistry, Porto Alegre, Brazil.

†Instructor, School of Dentistry, University of Michigan.

method has been used extensively in the past but, unfortunately, it possesses a number of disadvantages, one of the most significant being the variability of the wax pattern. All patterns contain residual strains due to forming operations and the restraint offered by the die to the thermal contraction of the wax when cooled to room temperature. Under certain conditions of time and temperature, these strains are released and this results in a change in the external shape and dimensions of the pattern. The manifestation of this strain release is often a variable quantity.[1]

Since the resultant casting can be no better than the wax pattern from which it is made, the variability of the wax pattern threatens the validity of results obtained that are based on judging the casting fit to a die. In addition, two other factors will influence the fit of a casting on a die. These are: (1) surface discrepancies that are difficult to perceive even microscopically, and (2) the inherent surface texture or roughness of the cast surface which can vary in accordance with a number of factors.[2]

Method of Measurement • Because of the afore-mentioned considerations, it was thought desirable to measure the difference in dimensions between the wax pattern made on a standard die and the gold casting made from this pattern. In this fashion, the difficulties resulting from the variability of the wax pattern could be eliminated, and since the casting need not be tried back on the original die, the influence of surface effects could be eliminated as well.

A study of this type would be of little use if castings other than those of actual dental size were evaluated. Consequently, the problem arose as to how to measure accurately a wax pattern and gold casting, the linear dimensions of which are of the order of 4 mm. To detect a 0.2 per cent deviation (which may be considered a practical limit detectable by rocking the casting on the die) would require a greater accuracy than 0.2 per cent of 4 mm., or 8 microns.

A comparator microscope can be read to 1 micron, but this accuracy is dependent on the ability to bring the cross hairs of the microscope to the same point a number of times and still maintain the same reading. Of necessity, the reference marks for this measurement must be extremely sharp and definitive. Obviously, measurements made to a rough surface, which is the appearance of a dental gold casting microscopically, would preclude an accurate determination of linear dimension. Consequently impressions were made in the die which could be reproduced in the wax pattern and the subsequent gold castings. These impressions were made with a steel instrument shaped in the form of a pyramid. Figure 1 shows the indentations as they appear in the gold castings. As can be seen, they are sharp and clear. Ten measurements were taken of the distance between these pyramids on the wax pattern as well as the gold casting for each experimental run. The maximum probable error based on these ten readings proved to be of the order of 0.05 per cent.

Method of Test • Two special brass dies were made to approximate a one-surface restoration and a full crown. All inlays and crowns are characterized by these two types of restorations, since they represent the conditions where the tooth surrounds the restoration and the restoration surrounds the tooth, respectively. The indentations were placed on the floor of the mold, which would correspond to the pulpal floor of the cavity preparation, and on the bottom and shoulders of the full crown mold, which would correspond

1. Phillips, R. H., and Biggs, D. H. Distortion of wax patterns as influenced by storage time, storage temperature and temperature of wax manipulation. J.A.D.A. 41:28 July 1950.

2. Pomes, C. E.; Slack, G. L., and Wise, M. W. Surface roughness of dental castings. J.A.D.A. 41:545 Nov. 1950.

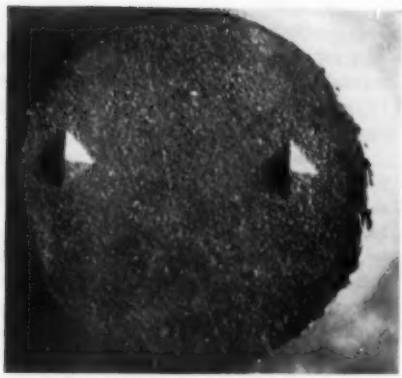

Fig. 1 • Pyramidal impressions as they appear on the pulpal floor of the one-surface type casting

to the pulpal floor and cervical shoulders, respectively, of the cavity preparation. The dies and resultant gold castings made from wax patterns which were formed on these dies are shown in Figure 2.

The wax pattern, formed from hard inlay wax, was made by pouring melted wax from a heated crucible into the die which had been preheated for one minute at 80°C. This procedure was necessary in order to reproduce the small pyramids in wax. The crucible was cleaned after each pattern was poured, and new wax was used for the next pattern since it was found that successive reheating of the same mass of wax would increase the coefficient of thermal expansion of the wax. This increase was probably caused by a burning-out of some of the lower melting point ingredients, which changed the resultant composition of the wax.

A positive pressure was applied to the pattern during the cooling process by the adding of a specific weight to the top of the pattern while in the die. The pattern was then stored for 24 hours at room temperature (70°F. ± 5°F.) and measured immediately before investing. The storage of the patterns allowed for the release of internal strains. Since the castings were not to be tried back on the dies, the factor of distortion was eliminated as a variable. Furthermore, if strains were to exist in the wax pattern, the investing procedure, which includes an exothermic heat of reaction of the gypsum binder, might cause an unpredictable change in the distance between indentations. It was thought desirable, therefore, to invest a strain-free pattern which had been measured accurately immediately before investing.

In order to reproduce the sharp pyramidal impressions in all the casting technics, the wax was removed after investing by placing the invested ring in boiling water and eliminating most of the wax with a syringe. In addition, the patterns were vacuum invested and one brand of new gold (medium hard) was used throughout the tests conducted.

The following four casting technics were investigated which were considered representative of present day gold casting procedures.

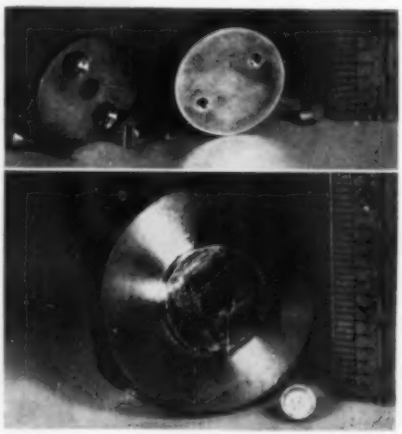

Fig. 2 • Above: Mold used for making one-surface type wax pattern. Below: Mold used for making full crown type wax pattern

Table 1 • Difference (%) between wax pattern and gold casting of individual test runs for the occlusal pattern

Casting Technic A	Casting Technic B	Casting Technic C	Casting Technic D
+0.4	+0.3	+0.4	+0.5
+0.1	0.0	0.0	+0.4
−0.2	−0.1	0.0	+0.3
−0.4	−0.1	0.0	+0.3
−0.5	−0.3	0.0	+0.2
−0.5	−0.3	−0.1	+0.1
−0.6	−0.4	−0.1	0.0
−0.7	−0.5	−0.2	−0.4
−0.8	−0.6	−0.8	−0.6
−0.8	−0.9		−0.8
Average %			
−0.4	−0.3	−0.1	0.0

A. Thermal compensation technic (investment containing cristobalite and quartz).

B. Thermal compensation technic (investment containing quartz).

C. Hygroscopic compensation technic (water bath immersion—investment containing quartz).

D. Hygroscopic compensation technic (wet asbestos liner—investment containing cristobalite).

Twenty castings were made by each technic, ten of the occlusal type and ten of the full crown type. The results of these tests are shown in Tables 1 and 2.

DISCUSSION OF RESULTS

The reproducibility can be evaluated by scanning the columns of figures (Table 1) which represent the individual test runs for each technic.

Since the accuracy of measurement was 0.05 per cent, the per cent difference as shown in Table 1 has been rounded off to the nearest significant figure. As can be seen, the variation between runs is of sufficient magnitude to indicate that the present thinking concerning the reproducible accuracy of the dental "precision" casting process should be re-evaluated. In all technics, a variation between +0.4 per cent (approximately) and −0.8 per cent (approximately) resulted when a number of castings were made under the same conditions. Technic C (hygroscopic—water bath immersion) appeared to have a greater number of test runs which fell within 0.2 per cent of each other. Technics A, B, and D had four runs within 0.2 per cent of each other, whereas Technic C had seven. It is debatable, however, whether this factor will be any consolation to the dental practitioner when a casting which he has just made, particularly by the direct technic, experiences the maximum variation.

Table 2, which lists the results of the

Table 2 • Difference (%) between wax pattern and gold casting of individual test runs for the full crown pattern

Casting Technic A		Casting Technic B*		Casting Technic C		Casting Technic D	
Pulpal floor	Cervical shoulder	Pulpal floor	Cervical shoulder	Pulpal floor	Cervical shoulder	Pulpal floor	Cervical shoulder
+0.5	+0.2	−0.2	−0.7	−0.3	+0.1	+0.5	−0.2
+0.4	−0.1	−0.4	+0.2	−0.3	+0.1	+0.3	+0.1
+0.2	−0.1	−0.7	−0.3	−0.3	+0.5	+0.1	+0.1
0.0	+0.5	−0.8	−0.6	−0.3	+0.2	0.0	−0.1
−0.1	−0.2	−0.9	−0.5	−0.4	−0.1	−0.1	+0.3
−0.2	+0.1			−0.6	−0.2	−0.2	0.0
−0.2	−0.3			−1.0	0.0	−0.3	+0.2
−0.2	+0.3			−1.1	−0.2	−0.3	−0.1
−0.3	−0.4					−0.6	0.0
−0.4	−0.5					−1.3	+0.4
Average %							
0.0	−0.1	−0.6	−0.4	−0.5	+0.1	−0.2	+0.1

*Casting Technic B was changed to a hygroscopic technic using a wet asbestos liner.

full crown pattern, shows that there is not only an irreproducibility between castings, but also a variable difference between the pulpal floor and cervical shoulder readings of each individual casting.

This latter effect is not as pronounced with the thermal compensating technic as it is with the hygroscopic technics, where the cervical shoulder measurements show more compensation, in general, than the pulpal floor measurements. This result substantiates the postulate that the resistance of the wax pattern to hygroscopic expansion of the investment represents a definite problem when casting crowns and perhaps mesioocclusodistal type inlays. This effect resulted even though casting Technic C (hygroscopic—water bath immersion) was carried out in 100°F. water; it was, in fact, most pronounced with this technic. Smyd[3] concluded that the water bath temperature

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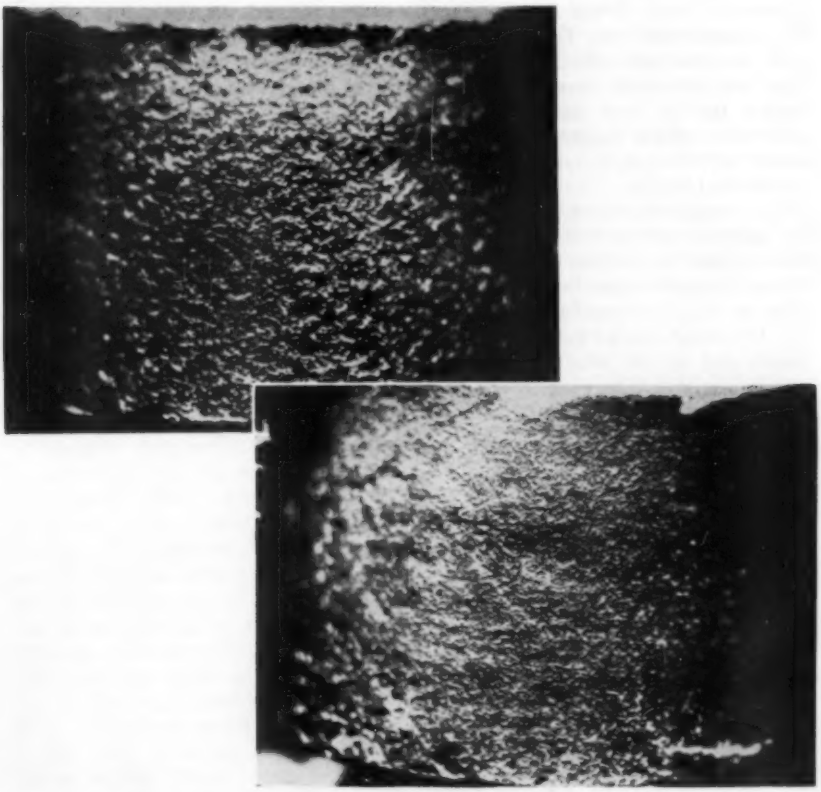

Fig. 3 • Above: Representative surface textures of one-surface type castings. Above: Casting Technic B (fit in mold—oversize). Below: Casting Technic A, C and D (fit in mold—undersize). Magnification about 20 ×

should be 124°F. for uniform hygroscopic expansion and suggested that a softer wax would be even more desirable. This appears to be a solution to the problem.

Another interesting result which can be seen from the average values of Table 1 is the fact that Technic D, which provided the most compensation, has reproduced the wax pattern exactly (average value). If it can be assumed that the wax pattern shrinkage is of the order of −0.4 per cent, then on the average, one-surface type castings will be too small or underexpanded. An attempt was made, however, to try these occlusal castings back in the die. It was found that in general the castings made with Technic B either fit or were too large while the other castings were invariably too small. (Even though the 24 hour storage condition plus other effects previously mentioned would be effective, a qualitative result was desired.)

Microscopic inspection of these casting surfaces showed that the surface of castings made by Technic B was found to be much rougher in surface texture than those of the other casting technics (Fig. 3). This result refutes the conclusions of Pomés and others[2] who did not detect any appreciable difference in roughness between different investments. In addition, on the basis of fit to the die, the order of roughness can be calculated as being approximately 0.4 per cent of 4 mm., or 16 microns while Pomés showed this order to be 30 or 40 micro-inches, which is about 1 micron.

SUMMARY AND CONCLUSIONS

Four representative casting technics were investigated in order to determine if a number of castings made by these technics would be dimensionally the same. The castings were of average dental size, and a method was devised to allow for measurements of 0.05 per cent accuracy.

The following conclusions were derived from this study:

1. The variations in size between a number of castings made by a present day dental casting technic may be of the order of 1.0 per cent.
2. The inherent surface roughness or texture of the casting will appreciably affect the subsequent fit.
3. A problem of obtaining uniform expansion exists when making full crowns and probably mesiooclusodistal inlays by hygroscopic compensating technics.

Choice of Books • Cherish a few books only, and those chosen not for their fame in the world but wholly for the pleasure that they give you. *C. E. Montague.*

Pulp reactions to direct filling resins

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The main purpose of operative dentistry, besides that of restoring the tooth, is to protect the pulp from injurious, exogenous influences. Consequently the innocuousness of the inserted filling is one of the principal requirements.

In the past the dental practitioner had to find out for himself whether a new filling material appearing on the market complied with this requirement and if necessary what he must do to protect the pulp. This individual research required years of clinical experimentation and the sacrifice of many pulps and teeth of trusting patients. The profession is greatly indebted to these pioneers for all the empirical knowledge they obtained concerning the customary filling materials.

At present, however, such a procedure is obsolete. Modern dentistry has research laboratories for such experimental investigations. Hence it is hard to understand why many practitioners today do not leave the testing of new filling materials to these institutions, awaiting a definite unbiased judgment before the materials are adopted in routine practice. This procedure would be more in accordance with the ethics of the profession, less precious time would be wasted, and fewer reputations would be impaired.

The fact, however, that the direct filling acrylic resins were so readily accepted leaves doubt that such a standard of professional conduct has been generally realized. Many practitioners were using these new materials even before any report concerning their effect on the pulp had appeared.

The first published experimental studies[1,2] did not contribute much to the knowledge of the properties of these resins because of the short periods of observation and the doubtful methods and criteria employed. Further studies[3-9] established the fact that the direct filling resins produce inflammatory changes in the pulp tissue. The outcome of these changes is still under discussion. Although some investigators[7-9] contend that this reaction is irreversible, others[4,10-12]

Director, Norwegian Institute of Dental Research.

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9. Maeglin, B. Kunstharzfüllungen und Pulpa. Schweitz. Monatschr. f. Zahnh. July 1952, p. 712.

10. American Dental Association, Council on Dental Research and Council on Dental Therapeutics. Status report on the reactions of the pulp to self-curing resinous filling materials. J.A.D.A. 42:449 April 1951.

hold the optimistic view that it is transient and that the pulp usually will survive.

As a contribution to this investigation, a new series of experimental investigations was made. Although only a limited number of cases were included in the study, the fact that these experiments were performed on the teeth of adults and that the period of observation was longer than in any previous investigation may make the results of experimental value.

MATERIAL AND METHOD

Fastcrown, Kadon, Plastofilling pf 3, Swedon and Sevriton were tested in 28 teeth of children 9 to 13 years of age and individuals 35 to 56 years of age.

In most instances a cavity was prepared in the gingival third of the buccal

11. Seelig, A. Effect of direct filling resins on the tooth pulp. J.A.D.A. 44:261 March 1952.

12. Paffenbarger, G. C.; Nelsen, R. J., and Sweeney, W. T. Direct and indirect filling resins. A review of some physical and chemical properties. J.A.D.A. 47:516 Nov. 1953.

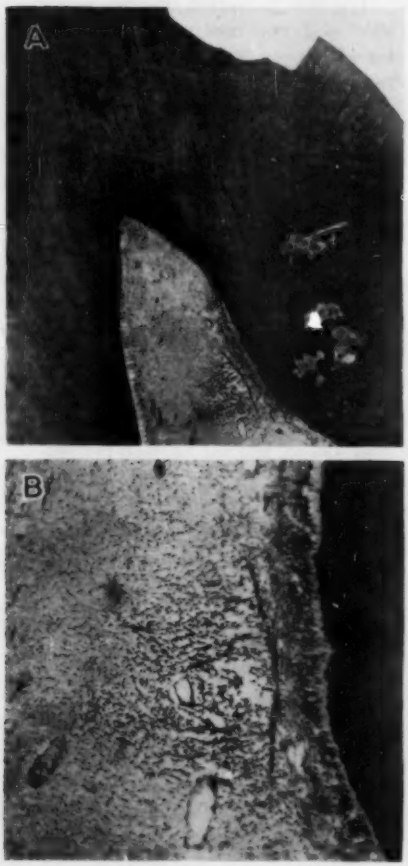

Fig. 1 • A: Cavity in tooth of 13 year old patient which was filled with direct filling resin. Distance of cavity floor from pulp, 2.8 mm. Location of inflammatory pulp reactions corresponds to cavity. B: Higher magnification of pulp injury. Damaged odontoblasts with disintegration of pulp tissue and masses of round cells. C: Control case. Amalgam filling that was in cavity for 1¼ months. Distance of cavity floor from pulp, 0.7 mm. Normal pulp. Broad, normally structured predentin zone indicates favorable stimulation

Fig. 2 • Left: Cavity in tooth of 11 year old patient that contained direct filling resin for three months. Distance of cavity floor from pulp, 1.8 mm. Masses of lymphocytes adjacent to zone of secondary dentin. Right: Control case. Zinc oxide-eugenol in cavity for three months. Distance of cavity floor from pulp, 1.8 mm. Normal pulp

surface, and the filling material was placed in direct contact with the dentin, which had been swabbed with 96 per cent alcohol. For the filling procedure, the manufacturer's directions were followed strictly. All the children's teeth were intact, but some of the surfaces of the adult's teeth were superficially carious before the operation.

The time of observation varied from 1 to 3 months in the case of the children and from 10 to 14 months in the case of the adults. The teeth were extracted and submitted for histological investigation. Untreated teeth and teeth in which cavities had been prepared simultaneously and filled either with amalgam or zinc oxide and eugenol were used as controls.

RESULTS

With the exception of one instance in which the prepared cavity was unusually shallow, the investigation revealed that pathologic changes had taken place in the pulp structures of all the teeth in which the direct filling resins had been inserted. In the children's teeth, these changes included destruction of odontoblasts and pulp cells subjacent to the cavity, accumulation of fluid and infiltration into the tissue by the inflammatory cells. No necrosis of the pulp was observed (Fig. 1-3).

In the adults, partial necrosis of the pulp occurred most frequently. The coronal portion of the teeth disintegrated, although some vital fibrous tissue was found in the root portion (Fig. 4). In other teeth, chronic pulpitis developed (Fig. 5, 6), and in some instances the entire pulp was necrotic (Fig. 7). In none of the cases was there a resolution or was the state of inflammation reversible.

Clinical symptoms were observed in only one instance—a bicuspid of a 56 year old individual developed apical periodontitis, and the tooth had to be removed 12 months after the insertion of the resin. The pulp was found to be totally necrotic.

DISCUSSION

It is maintained generally that the innocuousness of a filling material must be

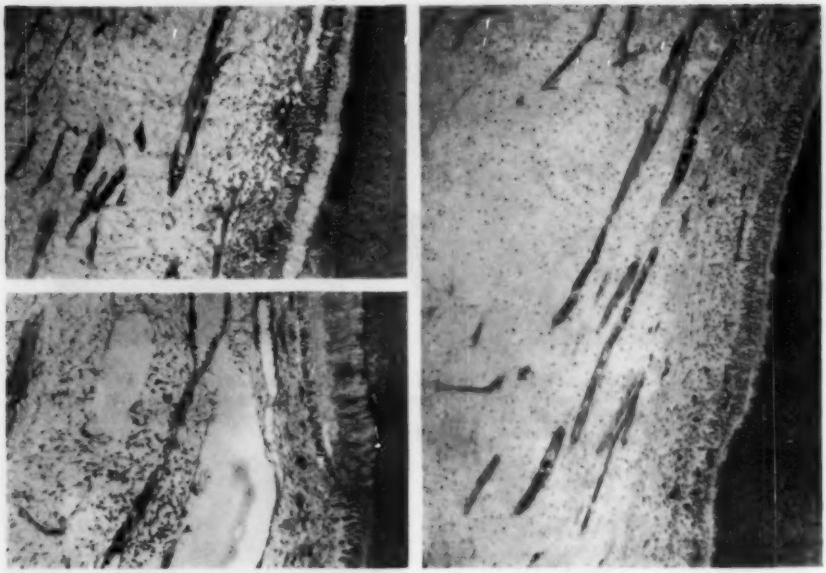

Fig. 3 • Details of pulps shown in Figure 2. Left: Various reactions to resin filling. Masses of lymphocytes in pulp tissue and similar cells seen in predentin zone (upper part); dilated, ruptured capillaries with disintegration of tissue and round cells infiltration (lower part). Right: Zinc oxide-eugenol filling; no reactions in pulp

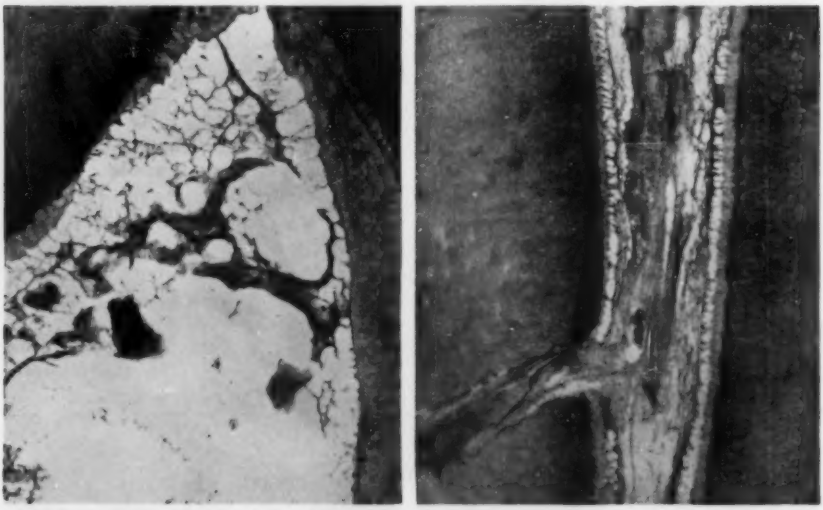

Fig. 4 • Direct filling resin inserted 14 months prior to extraction of tooth. Patient, 58 years old. Distance of cavity floor from pulp, 1 mm. Left: Necrosis and disintegration of pulp structure in crown portion. Right: Degenerated tissue in root portion

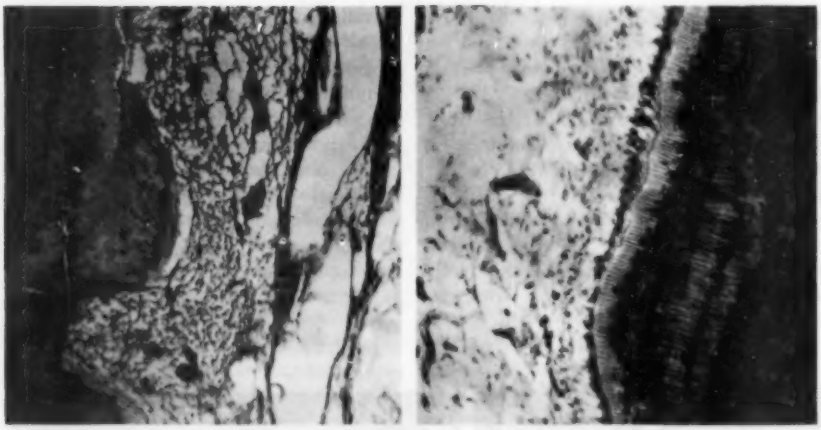

Fig. 5 • Details from two mandibular anterior teeth of 43 year old patient. Left: Cavity contained direct filling resin for ten months. Distance of cavity floor from pulp, 1.2 mm. Odontoblasts and pulp cells have completely disappeared in zone corresponding to cavity and have been replaced by masses of inflammatory cells. Right: Amalgam filling in cavity for ten months. Distance of cavity floor from pulp, 2.5 mm. Broad deposit of normally structured dentin that corresponds to cavity can be seen. No inflammatory reaction in pulp tissue

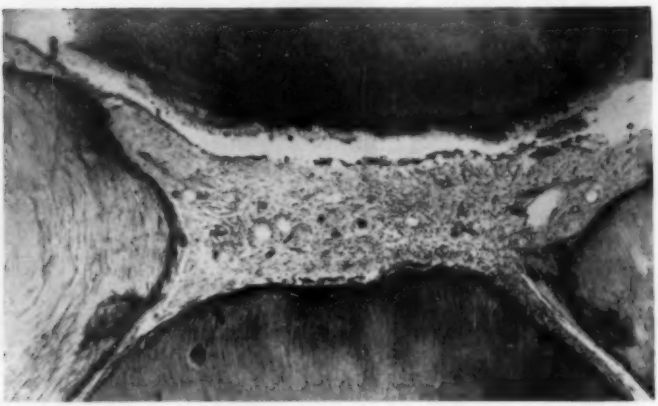

Fig. 6 • Direct filling resin placed in occlusal cavity in molar of 58 year old patient 14 months prior to extraction of tooth. Distance of cavity floor from pulp, 1.8 mm. Entire coronal portion of pulp evenly infiltrated by inflammatory cells. Chronic pulpitis evident

established by extensive investigation; however, its harmful possibilities can be judged on the basis of a far more limited number of experiments.

The reason for carrying out basic experiments of this kind in children is obvious. A clear manifestation of the tissue reactions is obtained in the pulps of children's teeth which have not previously undergone the reactive changes that often have occurred in the teeth of adults. It must be assumed, however, that the pulps of young teeth are capable of compensating for possible tissue injuries because of favorable circulatory and nutritional conditions. It was considered necessary, therefore, to observe the experiments carried out in adults over a comparatively long period of time.

In such investigations, the pathologic changes found often are ascribed to trauma and to heat produced during cavity preparation. By the extensive use of controls in this study, it was found

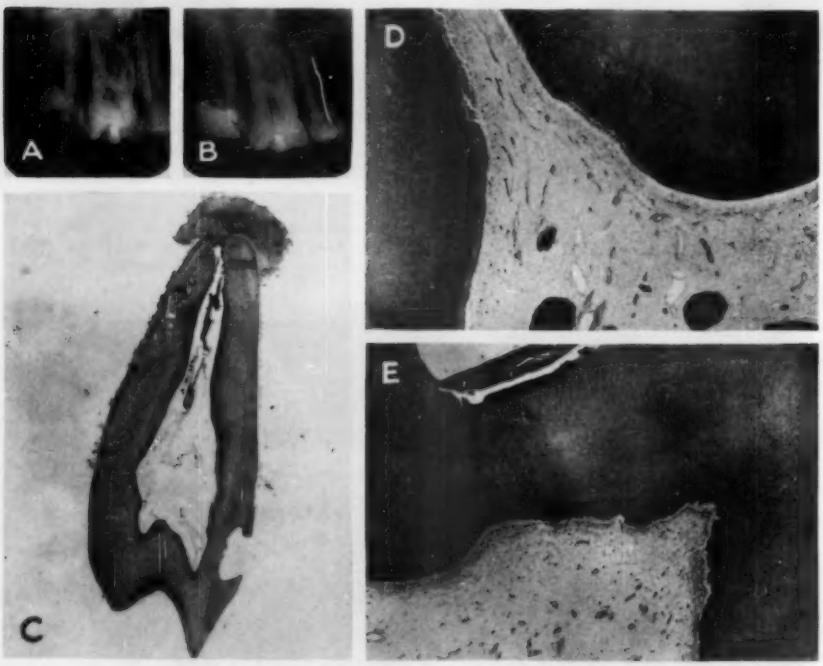

Fig. 7 • A: Three teeth of 35 year old patient before experiment was started. Second biscuspid was clinically intact, first molar had old amalgam filling and second molar had occlusal cavity. Class V cavity in second bicuspid filled with direct filling resin; Class I and Class V cavities in second molar filled with amalgam. No treatment of first molar. B: Ten months after treatment. Radiolucent area around apex of second bicuspid. C: Section through second bicuspid. Distance of cavity floor from pulp, 1.2 mm. Almost complete disintegration of pulp tissue and granuloma around apex. D: Section through pulp of untreated first molar. Normal pulp tissue with some pulp stones. E: Section through second molar. Part of occlusal cavity is seen. Distance of cavity floor from pulp, 1 mm. Buccal cavity situated to right, outside picture. Distance of cavity floor from pulp, 2.5 mm. Normal pulp tissue

that these uncertain factors could be excluded. On the other hand, the effect of the medicament employed for cleansing the cavity prior to the insertion of the filling should be taken into consideration. The use of 96 per cent alcohol does not produce any harmful effect, so far as could be judged from the control material; consequently, the alcohol was used in all instances.

The absence of clinical symptoms during the period of deterioration of the pulp tissue is not a new observation. Nevertheless, it should be stressed again that such observations are inadequate as a criterion of the innocuousness of a filling material. No attempt was made in this study to point out which of the properties of the resins caused a deleterious effect on the pulp. The fact was established, however, that the methyl methacrylate monomer constituted a very strong irritating agent.[13] Furthermore, it was demonstrated that, in addition to a shrinkage of about 7 per cent by volume during polymerization, the thermal expansion of acrylic resins probably amounts to more than seven times that of the tooth structure.[14] Consequently, an acrylic restoration expands or contracts seven times as much as does the tooth structure; therefore, a space will develop between the tooth and the filling. The properties mentioned would be sufficient to account for the findings described in this article.

SUMMARY AND CONCLUSIONS

The direct filling acrylic resins Fastcrown, Kadon, Plastofilling pf 3, Swedon and Sevriton were tested experimentally in 28 teeth of children and adults in order to determine whether these materials were harmful to the pulp.

The time of observation varied from 1 to 14 months. The findings led to the following conclusions:

1. All the filling materials tested caused pathologic changes in the pulp tissue when placed directly in contact with dentin in cavities of usual depth.

2. The assumption that these changes usually resolve and that the pulp will survive was not sustained.

3. An irreversible chronic pulpitis may develop which would result in partial and total necrosis of the pulp.

4. There appeared to be no difference in the properties of the various brands of resin so far as their effect on the pulp was concerned.

5. Because of their chemical and physical limitations, the direct filling resins of today appear not to meet the requirements of modern dentistry.

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Preservation of Knowledge • The images of men's wits and knowledge remain in books, exempted from the worry of time and capable of perpetual renovation. *Francis Bacon.*

Effect of topically applied stannous fluoride on dental caries experience in children

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Most workers agree that a 30 to 40 per cent reduction in the incidence of new dental caries in previously noncarious teeth will result from the topical application of an unbuffered aqueous 2 per cent sodium fluoride solution.[1-4] It has been suggested, however, that stannous fluoride is superior to sodium fluoride in reducing the solubility of powdered dental enamel[5] as well as the solubility of whole tooth sections in weak organic acids.[6] Experimental dental caries studies in the hamster[7] and in the rat[8-11] have corroborated these findings. It seems important, therefore, to determine if stannous fluoride is more beneficial than sodium fluoride in reducing the dental caries experience in children.

MATERIAL AND METHOD

During the spring of 1951, the parents of elementary and junior high school students in Bloomington, Indiana, were given the opportunity to request that their children participate in a clinical demonstration intended to measure the effectiveness of topical applications of fluorides in reducing the incidence of new dental decay. Approximately 1,400 students became available in this way. It was estimated, however, that time would not allow the inclusion of more than 1,200 children; by the elimination of all kindergarten and first grade children, approximately 1,200 participants were selected.

Each child participating in the program received a detailed dental examination in a mobile dental unit. Examinations were made under artificial light with a mouth mirror and an explorer. Compressed air was available for use at

*Director, Division of Dental Health, Indiana State Board of Health. Presently in the United States Public Health Service.

†United States Public Health Service.

‡Consultant, Division of Dental Health, Indiana State Board of Health.

§Assistant professor, School of Dentistry and department of chemistry, Indiana University, Bloomington, Indiana.

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the discretion of the examiner. All examinations were performed by one of the authors (C.L.H.). The dental examination cards were numbered consecutively at the time the initial examination was made, and a random distribution of numbers prepared by the division of public health statistics, Indiana State Board of Health, was then used to separate the children into three groups.

It was decided that approximately 250 children should receive an aqueous unbuffered 2 per cent solution of sodium fluoride. Nine hundred children were to receive an aqueous unbuffered 2 per cent solution of stannous fluoride applied to all the quadrants of the mouth. The control group was comprised of 277 children who received no treatment except a prophylaxis and an examination. The solutions were applied with cotton applicators to the teeth of the group whose teeth were to be treated with sodium fluoride and to the teeth of one half of the group whose teeth were to be treated with stannous fluoride. In these two groups the solution was applied once and allowed to dry for four minutes, according to the technic of topical application described by Knutson.[12] For the remaining half of the stannous fluoride group, the solution was applied as a spray. In this group the teeth were kept moist throughout the four minute application. The entire procedure for all three groups was repeated four times in such a manner as to space the applications from two to seven days apart.

Because stannous fluoride hydrolyzes and oxidizes quickly, all stannous fluoride solutions used in the study were prepared fresh each morning, and any solution remaining at the end of the day was discarded. The pH of the sodium fluoride solution was 6.8 and of the stannous fluoride solution, 2.9. The fluoride concentration of the sodium fluoride solution was approximately twice that of the stannous fluoride solutions.

DATA AND DISCUSSION

Of the 1,200 children who participated in the test initially, 1,053 were available for re-examination at the end of two years. Since the children were from six different schools and all schools were not represented in each group, the question of comparability of groups arose. An analysis of variance of the initial examination data revealed a significant difference in caries experience between schools. It was decided, therefore, to present the two year data from only those schools which were common to all four groups. This procedure reduced the total number of subjects included in the report to 620, but it increased the validity of the interpretation of results. The conclusions which may be drawn from this study are essentially the same whether 1,053 subjects or 620 subjects are reported.

Table 1 shows the caries increment over the two year period in terms of the average number of new carious units per person and in terms of the percentage difference or reduction in incidence of new caries based on the control group. The most complete estimate of the effects of the three fluoride treatments lies in the last column labeled "total DMF surfaces." These numbers were obtained from counts of all the carious surfaces

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12. Knutson, J. W. Sodium fluoride solutions: technic for application to the teeth. J.A.D.A. 36:37 Jan. 1948.

in all the teeth. In terms of this index, the sodium fluoride group experienced 36.3 per cent less new decay during the two year period than did the control group. The two stannous fluoride groups experienced 58.8 per cent and 65.5 per cent less new decay than did the control group. All of these percentage reductions are significant, as "t" tests indicated probabilities of less than 0.01 that the difference was due to chance alone. The apparent superiority of the stannous fluoride continuously applied by spray over sodium fluoride applied with a cotton applicator has a probability of being due to chance of 0.02, and that of stannous fluoride applied with an applicator over sodium fluoride has a probability of 0.06.

Table 1 shows the test results in terms of the components of DMF surfaces. The first two columns under "average DMF surfaces" separate the new carious surfaces on the basis of whether or not they occurred on teeth that previously were carious on some other surface. It appears that sodium fluoride afforded less protection for DF teeth than it did for caries-free teeth, whereas stannous fluoride showed considerably greater effect on DF teeth than on caries-free teeth. The caries increment in terms of DMF surfaces is also separated according to the surface of the tooth. The occlusal surfaces showed the greatest protection in all three fluoride groups, whereas the proximal surfaces showed less protection. The percentage reduction for buccal and lingual surfaces was not calculated, because these surfaces accounted for such a small part of the total new caries in all four groups.

The results in terms of new DMF teeth indicate a striking advantage for both kinds of stannous fluoride treatments over the sodium fluoride treatment. It should be recognized, however, that the index for DMF teeth does not represent the total effect over the entire mouth. In this study the index for DMF teeth takes into account only 86 per cent of the teeth which developed carious surfaces during the test period. It is suggested, therefore, that the 83.1 per cent reduction in caries shown by the index

Table 1 • Summary of caries findings

Average caries increment per person for two year period

Group	Subjects	Aver. DMF teeth	Average DMF surfaces					
			In prev. caries-free teeth	In prev. DF teeth	Prox. surfaces	Occ. surfaces	Bucc. and lingual surfaces	Total DMF surfaces
Control	139	2.84	3.83	.69	2.19	2.24	.09	4.52
A*	92	2.17	2.38	.50	1.70	.98	.21	2.88
B†	194	0.48	1.84	.02	1.59	.38	−.11	1.86
C‡	195	1.11	1.99	−.43§	1.31	.44	−.19	1.56

Percentage difference or reduction in increase of new caries compared to those of control group

Group	DMF teeth	In prev. caries-free teeth	In prev. DF teeth	Prox. surfaces	Occ. surfaces	Total DMF surfaces
A	23.6	37.9	27.5	22.4	56.2	36.3
B	83.1	52.0	97.1	27.4	83.0	58.8
C	60.9	48.0	100.0	40.2	80.4	65.5

*sodium fluoride by cotton applicator.
†stannous fluoride by cotton applicator.
‡stannous fluoride by spray, continuously applied.
§This negative number was taken as zero for computation of percentage reduction.

for DMF teeth for stannous fluoride is an overestimation of its real effect, and also that the 23.6 per cent reduction for sodium fluoride is an underestimation of its real effect. This suggestion is supported by previous investigations which have indicated a greater protection from sodium fluoride over a two or three year period.[1,13] It is also supported by the data for DMF surfaces in Table 1, which give a more conservative estimate of the difference between the sodium fluoride and stannous fluoride treatments.

The results of the study as shown in Table 1 are quantitatively different for each of the six caries indices. All of the indices, however, are consistent in showing a greater percentage reduction in caries with either of the stannous fluoride treatments than with the sodium fluoride treatment.

It was noticed that many of the regions which were diagnosed as being carious at the first examination were diagnosed as being noncarious at the second examination. It has been shown[14] that such occurrences are to be expected in a clinical test when the initial and final examinations are completely independent. These occurrences are referred to as reversals in diagnosis. They represent one fourth of all the instances in which teeth or surfaces are at a diagnostic border line between being carious and noncarious. Since some of the borderline conditions were microscopic lesions, then it may be true that reversals are to be accounted for by arrested incipient lesions.[14] This phenomenon can produce negative numbers in the data, especially when a small total caries increment is subdivided into its components as in Table 1.

The data in Table 2 show that there were approximately four teeth per 10,000 which showed reversals in diagnosis in the control group, while about 60 per 10,000 showed reversals in diagnosis in Group A, which received topically applied sodium fluoride. The two stannous fluoride groups showed a significantly greater number of reversals than the sodium fluoride group. The stannous fluoride groups had about three and a half times as many reversals as Group A, or approximately 200 teeth per 10,000. The unequal distribution of these reversals in diagnosis is one which would occur by chance only 28 times in 10,000; it is suggested, therefore, that the differences in fluoride treatment are associated with the differences in results.

Table 2 • Effect of fluorides on the number of reversals in diagnosis from carious to noncarious

Group	Reversals per 100 teeth
Control	0.04
A*	0.61
B†	2.03
C‡	2.12

*sodium fluoride by cotton applicator.
†stannous fluoride by cotton applicator.
‡stannous fluoride by spray, continuously applied.

CONCLUSIONS

1. Two years after an initial series of topical applications of a 2 per cent unbuffered solution of sodium fluoride and a 2 per cent unbuffered solution of stannous fluoride, it was found that stannous fluoride was significantly superior to sodium fluoride in reducing the dental caries experience of school children.

2. The number of reversals in diagnosis from carious to noncarious between the first and second examinations was significantly greater in the stannous fluoride groups than in the sodium fluoride group. This phenomenon may be associated with arrested incipient carious lesions.

13. Knutson, J. W., and Armstrong, W. D. Effect of topically applied sodium fluoride on dental caries experience; report of findings for second study year. Pub. Health Rep. 60:1085 Sept. 14, 1945.

14. Radike, A. W., and Muhler, J. C. Effect of reversals in diagnosis on the interpretation of clinical dental caries tests. (Abst.) J. D. Res. 33:682 Oct. 1954.

Acid-reducing effect of "antienzymes" in the mouth

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Recently, two contradictory reports have appeared concerning the effect of sodium lauroyl sarcoside on acid production in dental plaque material. Fosdick and coworkers[1] found that the use of a tooth paste containing 2 per cent of lauroyl sarcoside produced a noticeable decrease in acid production, with the antiacid effect lasting for 12 hours or more after use of the tooth paste. In repeating this work, Forscher and Hess[2] were unable to detect any reduction in acid production after use of a similar tooth paste. They suggested that the disagreement in the findings might be due to the fact that sugar rinses produce different falls in pH in different areas in the same mouth. For instance, simultaneous plaque samples from upper labial and lower lingual areas were found to give mean pH readings of 5.5 and 6.1, respectively. Therefore, a failure to standardize procedures for taking pH readings during an experiment may give misleading results.

The present study was undertaken in an attempt to provide additional evidence with regard to the effect of sodium lauroyl sarcoside on acid production in the mouth. The tests included pH measurements obtained according to the technic described by Fosdick,[1] as well as intraoral measurements by means of a glass electrode. The effect on salivary acid production was also studied. Another detergent, sodium lauryl sulfate, was also tested to provide additional information.

PROCEDURES

In the first series of tests, Fosdick's[1] method for evaluating inhibitors was followed. From a group of 24 persons, 11 subjects were selected as the best acid producers. Plaque material was scraped from the interdental surfaces of upper posterior teeth with a dental instrument and suspended in a minute amount of distilled deionized water on the flat end of a specially prepared Beckman calomel electrode. pH readings were taken with a micro glass electrode[3] which was connected to a Beckman model H-2 pH meter. The electrode was checked against buffers of pH 4 and 7 before and during the test. Readings were obtained immediately before and at five minute intervals after a 30 second rinse with a 50 per

This work was supported in part by the Bristol Myers Company.

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1. Fosdick, L. S., and others. New approach to the problem of dental caries control. J. D. Res. 32:486 Aug. 1953.

2. Forscher, Bernard K., and Hess, Walter C. Validity of plaque pH measurements as a method of evaluating therapeutic agents. J.A.D.A. 48:134 Feb. 1954.

3. Fosdick, L. S.; Campaigne, E. E., and Fancher, O. E. Rate of acid formation in carious areas, the etiology of dental caries. Illinois D. J. 10:85 March 1941.

cent glucose solution (pH 6.6). After these control values had been obtained, the subjects brushed their teeth morning and night for one week with the test dentifrice. On the morning of the test, which began at 8:30 A.M., the subjects did not brush their teeth, and pH readings of the plaque before and after a sugar rinse were obtained as previously described.

In a second series of tests, the effect of rinses of solutions of lauroyl sarcoside was studied. The test solution (15 cc.) was kept in the mouth for two minutes in the morning and at night before going to bed. The subjects were not permitted to use any tooth paste, but could brush their teeth with the test solution. After one week on this regime, pH measurements of plaque material were obtained as previously described. No rinse was permitted on the morning of the test. In separate trials, the effect of single rinses after two and after three hours was evaluated, along with a week's run using a rinse on the test day.

An intraoral method for measuring pH was also used for estimating the effect of single rinses of sodium lauroyl sarcoside and sodium lauryl sulfate. Readings were taken directly on the tooth surface with a Beckman 290-1 glass electrode and a KCl salt bridge-calomel electrode connected to a Beckman industrial model M pH meter. In these tests, the subjects were advised not to brush their teeth for two days before the experiment in order to build up plaque material on accessible tooth surfaces. Control readings were obtained by measuring pH before and at intervals of 1, 10, 17 and 23 minutes after a 10 per cent glucose rinse, held in the mouth for two minutes. Thirty minutes after the sugar rinse, a two minute rinse with the 0.4 per cent test solution was given, and, at specified periods thereafter, a second sugar rinse was given and pH readings were obtained in the same locations and at the same intervals as before.

In a third series of tests, the effect of rinses of 0.4 per cent sodium lauroyl sarcoside and 0.4 per cent sodium lauryl sulfate on salivary acid production was studied. Five cubic centimeters of paraffin-stimulated saliva was collected 1, 2 and 3 hours after a two minute rinse with the test solution, and pH readings were obtained before and after four hours incubation of 3 cc. samples of saliva mixed with 0.5 cc. of a 10 per cent glucose solution.

Table 1 • Effect of brushing one week, 11 subjects. Lowest pH reading of plaque after sugar rinse

Tooth paste	Exp.	Control
2% sodium dehydroacetate	5.2 ± .3	5.3 ± .2
1.8% sodium lauryl sulfate	5.1 ± .3	
2% sodium lauroyl sarcoside	5.3 ± .2	

RESULTS

The results obtained with 11 subjects after they had brushed their teeth for one week with three commercial tooth pastes are given in Table 1. One of these tooth pastes contained 2 per cent sodium lauroyl sarcoside; one, 1.8 per cent sodium lauryl sulfate; and one, 2 per cent sodium dehydroacetate. The figures represent the mean of the lowest pH readings obtained on each subject after the sugar rinse. It will be seen that the control and experimental readings are similar, demonstrating that none of the tooth pastes produced detectable acid-reducing effects under the test conditions.

Table 2 shows the results obtained after using mouth rinses of 0.1 and 0.4 per cent sodium lauroyl sarcoside. In the first three tests, two minute rinses were performed morning and night for one week, with intervals between the last rinse and the test ranging from 4 to 10 hours. As in the previous experiments, the control and experimental findings were similar. In all these tests in which the time interval between using the test agents and the performance of the test ranged from 4 to 10 hours, no acid-re-

Table 2 • Effect of sodium lauroyl sarcoside rinse. Lowest pH reading of plaque scrapings after rinsing with 50 per cent glucose

Time used	I*	Subjects	% Conc.	pH Control	Exp.
1 week	9-10	8	0.1	5.1±.1	5.2±.2
10 days	4	8	0.1		5.2±.2
1 week	9-10	6	0.4	5.3±.2	5.2±.2
One rinse	3	5	0.4	5.2±.2	5.3±.1
One rinse	2	10	0.4		5.4±.2

*Interval in hours between last exposure to the sarcoside rinse and the test.

ducing effect on interdental plaque material was found. It will also be seen from Table 2 that no acid inhibition was found after three and two hours when a 0.4 per cent sodium lauroyl sarcoside rinse was used. These negative findings are in agreement with those reported by Forscher and Hess.[2]

Whereas the previous results were obtained on plaque which was scraped from interdental surfaces, the data in Table 3 represent intraoral readings from labial surfaces. In these tests, two minute rinses of both 0.4 per cent sodium lauroyl sarcoside and 0.4 per cent sodium lauryl sulfate produced a reduction in acid, the effect in the plaque still being considerable after 2½ hours, but scarcely noticeable after 6 2/3 hours.

From the foregoing, it will be noted that the plaque tests in the present study were partly negative and partly positive, depending on test conditions. Therefore, further tests were performed on saliva. Table 4 shows the pH of stimulated saliva specimens which were collected 1, 2 and 3 hours after rinses with 0.4 per cent sodium lauroyl sarcoside and 0.4 per cent sodium lauryl sulfate and incubated with glucose. For comparison, pH readings of saliva specimens collected after a penicillin rinse also were included. The findings show that all the test rinses produced an acid-reducing effect on the different salivary samples, thus giving evidence of a prolonged effect on saliva. The rinses containing sodium lauroyl sarcoside and sodium lauryl sulfate produced similar moderate effects, while the penicillin rinse caused a considerable reduction in salivary acid production. This action of penicillin on saliva has been reported previously.[4, 5]

Table 3 • Effect of a 2 minute rinse of .4% sodium lauroyl sarcoside and .4% sodium lauryl sulfate. Lowest intraoral pH reading in plaque after rinsing with 10% glucose. Mean of 12 tests

Test rinse	Time	pH Control	pH Exp.
Lauroyl sarcoside	2½ hrs.	5.6±.4	6.3±.3
Lauryl sulfate	2½ hrs.	5.5±.3	6.0±.3
Lauroyl sarcoside	6⅔ hrs.	5.2±.3	5.5±.3
Lauryl sulfate	6⅔ hrs.	5.3±.2	5.5±.3

DISCUSSION

The observation that the test agents caused a decrease in acid production under certain conditions and produced no effect under other conditions is of some interest. Positive findings were obtained when readings were taken *in situ* on accessible tooth surfaces. No effect was found when measurements were obtained on material from interdental spaces. These contradictory findings appear to result from the complexity of the oral environment and demonstrate that plaque tests must be used cautiously for screening purposes. In any mouth, the amount and quality of plaque is known to vary considerably in different locations. In certain areas, plaque may be scanty or absent; in other areas, it may vary from thin to thick and from a loose to a relatively firm consistency, and it may be located on freely accessible surfaces or be packed into pits and fissures or interdental spaces. Considering these conditions and, in addition, other varia-

4. Zander, H. A., and Bibby, B. G. Penicillin and caries activity. J. D. Res. 26:365 Oct. 1947.

5. Brudevold, Finn, and Hawes, R. R. Effect of penicillin dentifrices on acid production in dental plaques and saliva. (Abst.) J. D. Res. 31:474 Aug. 1952.

bles in the oral environment, it is hardly to be expected that a test agent should produce uniform results in the mouth.

The most unfavorable condition for the action of an inhibiting agent appears to exist in those locations where caries predominates, that is, in fissures and interdental spaces. In addition to being relatively inaccessible, these areas usually have heavy plaque deposits, and, as shown by Muntz and Miller,[6] bulky plaque is not easily penetrated by agents such as synthetic detergents. Their observation that agents may exert an inhibiting effect on the surface of the plaque and fail to penetrate into and reduce acid production in the bulk of the material may in part explain our negative findings. The effect of a test agent according to this view would depend on the thickness and penetrability of the plaque material. Consequently, our positive findings, which were obtained on labial surfaces, would indicate that a relatively thin plaque, as present on these surfaces, is more easily penetrated.

Forscher and Hess, like ourselves, failed to find any prolonged effect of sodium lauroyl sarcoside on acid production in the plaque from interdental spaces. The acid-reducing effect which we found on the labial plaque was considerably less noticeable than that which Fosdick reported on the plaque from the interdental spaces. Although we were unable to duplicate Fosdick's results, our findings suggest that either negative or positive results may be obtained, depending on the type of plaque selected for pH measurements. This does not necessarily invalidate the use of plaque tests for screening purposes, but, rather, points to the need for careful standardization of test procedures.

In this study, perhaps the best evidence of an over-all acid inhibitory effect in the mouth was produced by the salivary findings. Since the effect on saliva may be caused by action on organisms from both the dental plaque and the mucous membranes, however, this type of test provides no information about which areas in the mouth have been affected by the test agents.

Table 4 • Effect on salivary acid production of a single rinse of .4% sodium lauroyl sarcoside, .4% sodium lauryl sulfate and 800 units of penicillin. Mean pH readings after four hours incubation

		Sample collected after rinse		
	Before rinse	1 hr.	2 hrs.	3 hrs.
Control*	5.0 ± .4	5.2 ± .4	5.1 ± .5	5.2 ± .4
Sodium lauroyl sarcoside*	5.1 ± .6	5.7 ± .5	5.9 ± .5	5.7 ± .7
Sodium lauryl sulfate*	4.7 ± .3	6.1 ± .7	5.7 ± .7	6.0 ± .6
Penicillin†	4.9 ± .8	6.8 ± .5	6.9 ± .5	6.9 ± .6

*11 subjects.
†8 subjects.

The mechanism of action of sodium lauroyl sarcoside and sodium lauryl sulfate has not been established definitely. It is possible that a detergent effect is involved, in addition to an inhibitory effect. The positive findings on saliva produced by our test agents may be explained by a detergent effect or by a superficial inhibitory effect on the plaque in the mouth or by both of the mechanisms working together. The detergent effect alone would result in a decrease in the number of salivary organisms. A prolonged decrease in salivary acid production is also likely when those superficial layers of the plaque which have been exposed to and affected by a test agent are gradually washed off and mixed with saliva.

Whatever the mechanism of the acid-reducing effect of sodium lauroyl sarcoside and sodium lauryl sulfate may be, it is significant that these compounds were found to exert no measurable effect in interdental spaces where caries lesions

6. Muntz, John A., and Miller, Benjamin F. Factors influencing penetration of synthetic detergents and certain other compounds into dental plaque materials. J. D. Res. 22:73 Feb. 1943.

are most apt to occur. Fosdick has advanced the interesting theory that inhibitors, in order to be effective against dental caries, must be retained in the plaque material for a prolonged period. According to our results, it seems equally important for agents to have the ability to penetrate into plaque material in inaccessible locations and exert their acid-reducing effect throughout the plaque.

CONCLUSION

Sodium lauroyl sarcoside and sodium lauryl sulfate were found to be similar in their acid-reducing effect. After two hours, this effect was confined to accessible surfaces and to saliva and was not found on plaque material located in interdental spaces, where caries lesions are most apt to occur.

Extent of distribution of nerve fibers in the human tooth

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The fact that severe pain is brought about by drilling in the unanesthetized tooth, and by other stimuli as well, has instigated many investigations to discover the morphologic basis for the reception of such painful stimuli.

Diverse interpretations have been made of the mechanism for the reception of pain elicited by stimulation of the dentin. Any viewpoint on this mechanism can be substantiated by past literature.

The two principal interpretations of the dentinal innervation mechanism are: (1) that the sensory reception is direct, passing by way of nerve fibers which terminate within the substance of the calcified dentin and (2) that the sensory reception is indirect, with the dental nerves limited to the pulp chamber and receiving stimuli through an intermediary, namely, the odontoblast and the Tomes' fiber.

The proponents and opponents for either school of thought are approximately equal in number. Most investigators have left something to be desired in their work and conclusions. Conclusive evidence has seldom been offered.

The tooth, especially the pulp and the dentin, has many structures that color with nerve stains. Hence, the selectiveness of differential staining becomes a prime factor in any histological study of this problem. The silvering and impregnation technics used in investigations carried on over 20 years ago were less specific and more subject to caprice than the methods of today. Consequently, the methods themselves were the cause of contradictions and made duplication impossible.

From thesis for Master of Science degree, Northwestern University, 1953.

Although within the past quarter century a few researchers have had more success in their investigations than their predecessors, there is still no general agreement concerning the fundamental facts of dental innervation. The purpose of the present investigation, therefore, was to re-examine dental innervation with a newer, refined technic, which is considered more reliable than previous methods in the demonstration of free nerve fibers coursing singly and in small groups.

MATERIALS AND METHODS

After preliminary experiments with the Bielschowsky block stain[1] and Davenport's alcoholic silver nitrate,[2,3] it was decided that the most suitable and most productive stain for this research would be a silver-peptone compound. The stain was manufactured in the laboratory according to a method, proposed by Davenport and others,[4] in which a pharmaceutical peptone[5] was used.

The impregnation technic was the two-hour Protargol method.[6] The finest differentiation of neural elements was obtained when the sections were reduced with amidol or, especially, pyrogallic acid. Rather than allow the entire section to darken in reduction, the tissues were immersed in the reducing solution for only a second or two and then transferred to a water bath to slow down and halt further reduction. This procedure seemed to contribute materially to a finer differentiation of minute nerve fibers.

Practice with the technic was essential in order to perfect it to a point where consistency and duplication could be anticipated. To eliminate the intricacies of staining nerves in the presence of calcified tissues, the stain was run initially on extirpated pulp tissue. Teeth were collected immediately after extraction and were cracked open with a hammer and chisel; the pulp was removed as gently as possible and placed in a fixative.

The fixatives used were Bouin's solution, containing 10 per cent Formalin in saturated picric acid with 0.5 per cent trichloracetic acid replacing acetic acid,[7] and a solution composed of 20 parts of 40 per cent formaldehyde, 5 parts of glacial acetic acid, and 75 parts of distilled water.[8] All tissues were fixed for at least 24 hours in one of these solutions.

After approximately seven months of experience with the bare pulp tissue, the experiment was made on whole human teeth. Noncarious, vital, human teeth were collected promptly after extraction and placed in one of the two fixatives; then they were decalcified in 5 per cent nitric acid. When decalcification had been acomplished, the tissues were washed in running tap water for 24 to 36 hours, placed in an alkaline bath with a pH of 8 for 24 hours, and then rewashed in tap water for 24 hours before dehydration preparatory to their embedding in paraffin. To facilitate thorough infiltration with paraffin, all teeth were placed in a paraffin bath under reduced pressure for 30 to 45 minutes—approximately the time for bubbling to cease—prior to embedding.

The blocks were sectioned at 8 to 10 microns and stained.

1. Davenport, H. A.; Windle, W. F., and Beach, R. H. Block staining of nervous tissue with silver. IV. Embryos. Stain Technol. 9:5 Jan. 1934.

2. Davenport, H. A. Silver impregnation of nerve fibers in celloidin sections. Anat. Rec. 44:79 Nov. 25, 1929.

3. Davenport, H. A. Staining nerve fibers in mounted sections with alcoholic silver nitrate solution. Arch. Neurol. & Psychiat. 24:690 Oct. 1930.

4. Davenport, H. A.; Porter, R. W., and Myhre, B. A. Preparation and testing of silver-protein compounds. Stain Technol. 27:243 Sept. 1952.

5. Peptone used in this study was obtained from Cudahy Packing Co., Omaha.

6. Davenport, H. A.; McArthur, J., and Bruesch, S. R. Staining paraffin sections with protargol; optimum pH for reduction; 2-hour staining method. Stain Technol. 14:21, Jan. 1939.

7. Adams, T. W.; Thomas, R. W., and Davenport, H. A. Staining sections of peripheral nerves for axis cylinders and for myelin sheaths. Stain Technol. 23:191 Oct. 1948.

8. Rexed, B. A modified myelin staining method for paraffin sections. J. Neuropath. & Exper. Neurol. 7:462 Oct. 1948.

Fig. 1 • Longitudinal section of human dentin, showing unusual staining reaction of a Tomes' fiber which mimics a nerve fiber. D—dentin; T—Tomes' fiber

RESULTS

In the tooth and its structural elements, many argyrophilic elements are present, each reacting similarly to the stain but yet maintaining its individual characteristics, both morphological and histotechnical. The specificity of nerve stains is not as fine and as exclusive as might be desired; consequently consideration must be given to this in the analysis of any such material, especially in dental tissues, in which certain nonneural dental structures in addition to the nerves stain consistently. Moreover, many of these structures closely resemble nerve fibers; therefore, they may be misinterpreted as such.

The odontoblastic nuclei stained constantly with this technic. The intensity and degree of staining could be varied by simple manipulation of the reducing process, so that the nuclei ranged from a deep purple-brown to a light yellowish brown color. Since these cells form a relatively dense and compact cellular layer in the most peripheral portion of the pulp, the most desirable circumstance was to have these elements react in a manner which would not totally obscure the nerve fibers. The relation of nerve fibers to odontoblasts is an important association to determine; hence, for the most part, the stain reaction of the odontoblasts was reduced to a level at which identification was positive and obscurity minimal.

The Tomes' fibers also reacted in a positive manner to the silver-peptone stain (Fig. 1). This reaction likewise could be controlled effectively by cautious reduction of the impregnated silver. The dentinal fibrils exhibited a wide variation in their staining reaction, often mimicking nerve fibers. This reaction occurred primarily in the dentin immediately centrifugal to the zone of calcification. The fine linear appearance seemingly was due to either a shrinkage of the Tomes' fiber or a concentration of the stain on a ridge of the Tomes' fiber. By careful guidance of the reducing process, the Tomes' fibers could be reduced to a point where actually they were unstained and could be identified only by the presence of a shadowlike form.

With the exception of one tooth, all the teeth employed in this problem were noncarious. Dentin formation was, at best, proceeding at a slow rate with no evidence of active dentinogenesis. For purposes of comparison, one carious tooth with an unexposed pulp was prepared and examined for the precollagenous Korff's fibers which would occur in the peripheral part of the pulp opposite the site of caries where a compensatory secondary dentin deposition would be located. These precollagenous argyrophilic structures readily stained with the silver-peptone, which rendered them a dense brown color with a slight purple hue. The conventional spiral or corkscrew form of the fibers (Fig. 2) facilitated differential diagnosis. Generally, there was a staining difference at the point where the transmutation to a collagenous condition took place, that is, at the pulpal edge of the predentin. The collagenous ground substance of the dentinal matrix revealed a lighter-staining

reaction; and therefore, there was a sharp delineation between the two areas.

The connective tissue of the pulp is composed of precollagenous and collagenous fibers with elastic fibers absent.[9] The precollagenous fibers are most abundant in the embryonic and immature pulp, whereas the collagenous elements are more plentiful in the mature pulp. The precollagenous components normally did not stain differentially with the silver-peptone, but the distinction could be brought out by heavy staining. These components were, of course, very evident when they were bundled together to form Korff's fibers. The connective tissue fibers presented a picture of fine threads forming a delicate reticulum.

For the most part, the connective tissue cells of the pulp did not stain distinctively. The nuclei of the connective tissue cells consistently stained well, as can be seen in most of the photomicrographs of the pulp tissue.

All surfaces that exhibited a variance in the degree of calcification, such as the zone between the predentin and the dentin and also the boundaries of the interglobular dentin, showed also a positive staining reaction. Controlled reduction lightened this reaction also.

By far the finest differentiation and selective staining of nerves took place in the extirpated pulp tissue. The nerve fibers, large and small, running in bundles, in small groups and singly, took on a jet black coloration which readily distinguished them from nonneural histologic entities.

The connective tissue sheaths, the endoneurium and the sheath of Henle, and Schwann's sheath stained slightly but sufficiently to permit identification of such specialized structures. The main bulk of the nerve fibers appeared to be myelinated; since the surrounding connective tissue sheaths stained somewhat, the myelin was relatively well outlined, although not specifically stained itself

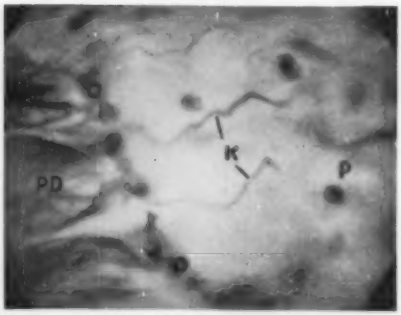

Fig. 2 • Active secondary dentinogenesis opposite a site of caries. Korff's fibers are apparent. K—Korff's fiber; O—odontoblasts; P—pulp; PD—predentin

(Fig. 3, left). Fine fibers, some of which are presumably unmyelinated, were also identified.

After entering the pulp canal, the nerve fibers proceed toward the pulp chamber in large bundles which occupy most of the space in the root canal. The side branches which are periodically sent toward the odontoblasts and the predentin as the bundles of nerve fibers proceed coronally toward the main pulp chamber can be seen in Figure 3, right.

On reaching the pulp chamber, the large confined bundles break up into smaller groups of nerve fibers, which branch and anastomose freely. There is then a progressive decrease in the number of nerve fibers contained in a bundle; eventually the nerve fibers are directed toward the odontoblasts in small groups of approximately three or four fibers and singly as well. The connective tissue ensheathments appeared to be carried with the nerve fibers even as far as the predentin (Fig. 4, above and center). Other fibers run among the odontoblasts completely unsheathed (Fig. 4, below).

Some nerve fibers presented character-

9. Orban, Belint. Oral histology and embryology, ed. 2. St. Louis, C. V. Mosby Co., 1949.

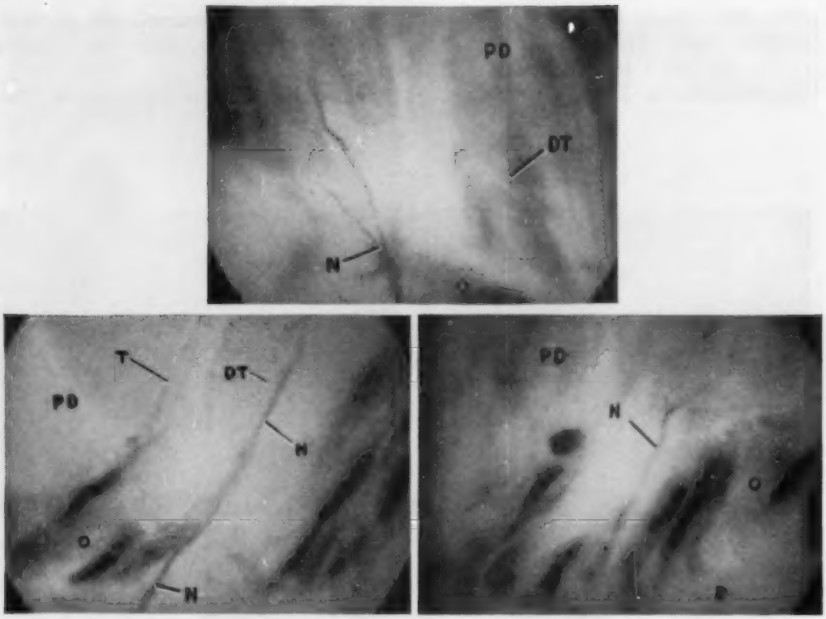

Fig. 5 • Above: Nerve fiber branching at pulpal border of odontoblastic layer and entering predentin. Below left: Nerve fiber from large bundle of fibers lying close to periphery of pulp, entering odontoblastic layer and joining a Tomes' fiber. Below right: Nerve fiber from odontoblastic layer, entering predentin and bifurcating. DT—dentinal tubule; N—nerve fiber; O—odontoblasts; P—pulp; PD—predentin; T—Tomes' fiber

run within the dentinal tubules in longitudinal sections, it is reasonable to assume that such fibers might be present in transverse sections as well. The slides were examined for such occurrences. Under oil immersion examination, fine black dots were observed in the tubules in the predentin adjacent to both the wall of the tubule and the Tomes' fiber and also in the space between the wall and the fiber. Such a black dot could be one of three things: (1) a cross section of a nerve fiber, (2) a precipitate of the reduced stain, a relatively common occurrence with silver stains, and (3) an aggregate of stain on the wall of the tubules or the Tomes' fiber.

Under careful focusing from one surface of the section to the other, some of these black dots appeared to have length, at least, equal to the width of the section. The fact that others immediately went out of focus indicates their size. The structures which had some length were probably intratubular nerve fibers because known stain precipitates and aggregates that were observed in other slides were characteristically globular in nature.

No nerve fibers of any type or description were observed in the tubules, on the Tomes' fibers or in the matrix of the fully calcified dentin of any of the teeth; nor was there any evidence of any fibers passing from the predentin into the fully hardened dentin.

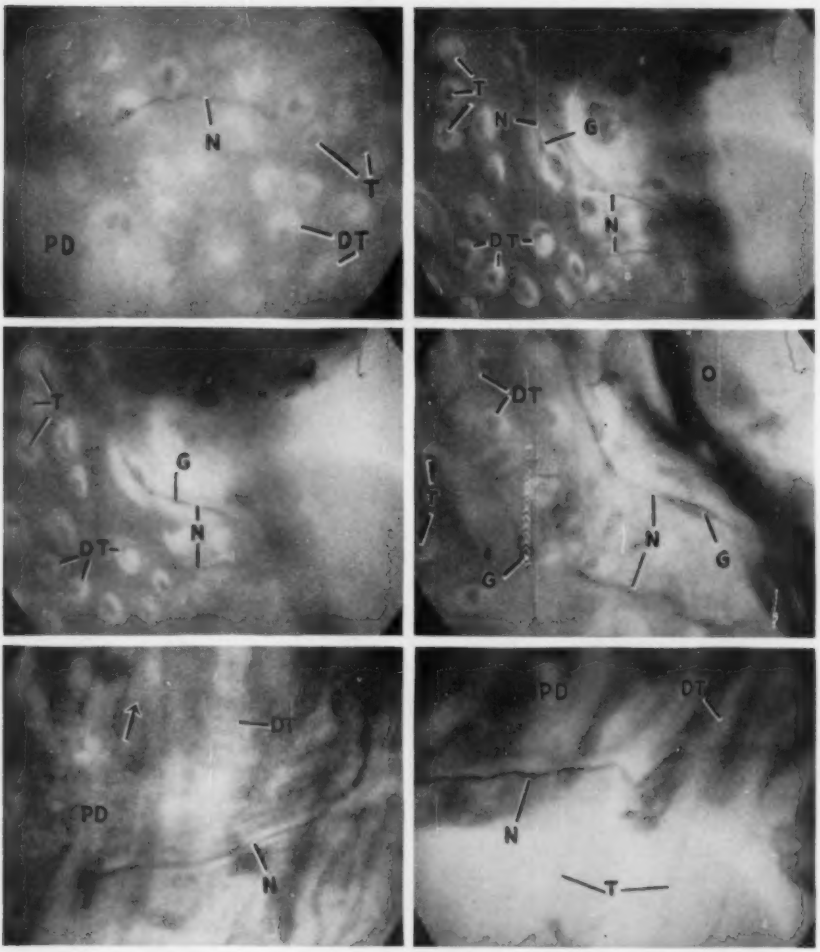

Fig. 6 • Above left: Nerve fiber entering tubule, contacting a Tomes' fiber, and running out again into dentinal matrix. Above right and center left: Different focal points of same field, showing general course of predentinal nerve fiber in human tooth. Center right: Predentinal nerve fibers in cross section of predentin, running haphazardly through matrix. Below left: Nerve fiber running across dentinal tubules and looping toward calcified dentin. Below right: Nerve fiber in human predentin that was passing almost perpendicular to the dentinal tubules. DT—dentinal tubule; G—gemmule; N—nerve fiber; O—odontoblasts; PD—predentin; T—Tomes' fiber

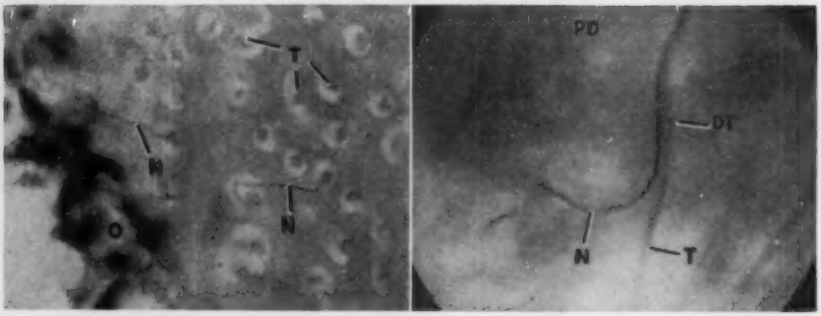

Fig. 7 • Left: Nerve fibers in cross section of human predentin, passing between dentinal tubules. Right: Nerve fiber, altering its course from extratubular position to apparently intratubular route. DT—dentinal tubule; N—nerve fiber; O—odontoblasts; PD—predentin; T—Tomes' fiber

DISCUSSION AND SUMMARY

The human tooth has a relatively vast number of nerve fibers that enter the pulp through the apical foramens. The acute degree of sensitiveness manifested in the tooth can be easily explained on the basis of the innervation.

The nerve fibers proceed through the length of the root canal toward the main pulp chamber. As the nerve fibers pass parallel to the odontoblasts, side branches are periodically given off. In the root canal the nerve fibers run in one large bundle which occupies most of the space in the canal. The root canal widens in the direction of the crown, and the confined nerves spread out somewhat and even separate into smaller bundles. On reaching the main pulp chamber, or at least the widest portion of the pulp canal, the large bundles of nerve fibers divide and separate into smaller groupings. These groupings progressively decrease in nerve fiber content as the bundles become still smaller.

Throughout the entire mass of the pulp, nerve bundles of varying sizes can always be observed near the odontoblasts. Rarely is a field observed in which the odontoblasts are distant from any neural elements.

There was no evidence of the subodontoblastic plexus of Raschkow, the existence of which has been proved and disproved in past work. Whenever nerve fibers entered the odontoblastic layer, they originated from a nerve bundle close to the odontoblasts, but not immediately subjacent to them. These bundles lie in the pulp, further inward than the layer which might be identified as the layer of Weil, in which Raschkow's plexus supposedly is located.

Strictly speaking, very few nerve fibers appeared to terminate among the odontoblasts. One such nerve fiber is apparent in Figure 4, below. This fiber contains the knobby excrescences distinctive of terminating nerves. It was practically impossible to follow a nerve fiber from one section into the next serial section because of the compactness and consistent staining of the odontoblasts, which often totally obscured the nerve fibers. Hence, when an isolated nerve is located in such a position, it is injudicious to say that it does not proceed into the predentin simply because one may not be able to view such a continuance. It can be stated therefore that most nerve fibers converge on the odontoblasts, pass between them and invade the predentin. Numerous assumptions have been made in the past

to the effect that the nerve fibers terminate in, on or around the odontoblasts. There was little convincing evidence in support of such an assumption; in fact, in some cases there was evidence to refute it.

When the nerve fibers penetrate the predentin, they do not travel any special, set route. They branch, loop and swerve, following a haphazard course. Some fibers run in conjunction with the Tomes' fibers, while others run intertubularly. In other words, the nerve fibers in the predentin are unrestricted as to their direction and location.

The most illuminating material was obtained in those sections which were cut perpendicular to the dentinal tubules and the Tomes' fibers. The fibers that were observed to be across the tubules and Tomes' fibers in longitudinal sections were revealed in their true relations. Under these conditions, the nerves pass throughout the intertubular predentinal matrix. They pierce the walls of the tubules; some fibers appear to make a contact of some sort or another with the Tomes' fibers and then to proceed out again into the matrix, to extend with the Tomes' fibers for a short distance or to terminate thereon.

The points of contact between the nerve fibers and the Tomes' fibers are evidenced by a slight dark swelling, which is clearly apparent in Figure 6, above left. These varicosities or gemmules appear also on the nerve fibers in the intertubular matrix.

The small black dots of some length observed within the cross sections of the dentinal tubules were interpreted as cross sections of intratubular nerve fibers, even though the identification was incomplete. At any rate, these structures do not possess characteristics of stain precipitates or aggregates.

The fully calcified dentin in the teeth examined was completely devoid of nerve fibers of any type.

It is of interest to examine the theories of the mechanism of pain reception in the human tooth in the light of the revelations of this study. Nerve fibers were traced previously into the predentin by such investigators as Lewinsky and Stewart[12] and Bernick.[13] According to Bernick's description, however, the fibers, which he describes as having terminal varicosities, return to the odontoblastic layer, in which they terminate. Although Bernick supplies a number of photographs to illustrate the entrance of the fibers into the predentin, he provides no photographs to show the return of the nerve fibers to the odontoblasts but illustrates this phase of his work with drawings only. Moreover, he failed to point out definitely the relation of the predentinal nerve fibers to the dentinal tubules and the Tomes' fibers. His sections, at least those used for illustrating his monograph, were all cut longitudinally with respect to the dentinal tubules; and therefore, it is impossible to distinguish an intratubular from an extratubular nerve fiber.

When considering a final position on the problem, one must ultimately take sides with either Mummery[14-17] or Hopewell-Smith.[18-20] Absolute accord is unnecessary, but there must be a general modified agreement with one or the other. Mummery's description of the fibers was well dealt with by Stewart[21, 22]

12. Lewinsky, W., and Stewart, D. The innervation of the dentin. J. Anat. 70:349 April 1936.

13. Bernick, S. Innervation of the human tooth. Anat. Rec. 101:81 May 1948.

14. Mummery, J. Howard. A short preliminary note on the distribution of the nerve fibers of the dental pulp. Proc. Roy. Soc. Med., Sec. Odont. 4:51 March 1911.

15. Mummery, J. H. A short supplementary note on the nerves of the dentine. Proc. Roy. Soc. Med., Sec. Odont. 6:23 Nov. 1912.

16. Mummery, J. Howard. On the nerve end-cells of the dental pulp. Brit. J. D. Sc. 62:234, 1919.

17. Mummery, J. Howard. Report on the innervation of the dentine. (Abst.) Pacific Den. Gaz. 30:505, 1922.

18. Hopewell-Smith, A. The innervation of the tooth-pulp. D. Cosmos 41:33 Jan. 1899.

19. Hopewell-Smith, A. The so-called "innervation" of the dentin: an epicritism. D. Cosmos 58:421 April 1916.

20. Hopewell-Smith, Arthur. The non-innervation of dentine. D. Surgeon 21:583 Sept. 13, 1924.

in his studies of denervation, in which he showed that the fibers described by Mummery were still present after the inferior dental nerve was sectioned and axon degeneration took place.

Hopewell-Smith maintained that the nerve fibers terminated directly on the odontoblasts and that, consequently, the sole function of these cells was the transmission of nervous impulses. The interpretation today is that the odontoblast brings about the calcification of the cementing substance.[8] The presence of alkaline phosphatase in the subodontoblastic region and in the odontoblasts has been related to dentin formation.[23] Thus the odontoblast is active in at least two important functions.

From the histological evidence, it appears that the mechanism of sensory reception is located in the Tomes' fiber. Either the Tomes' fiber transmits a neural type of stimulus to the nerve fibers in the predentin; or it undergoes a physical change, and this change acts on the nerve fibers. This latter explanation was the theoretical assumption of Bödecker[24, 25] and Gysi.[26] According to these investigators, the Tomes' fiber reacts to suitable environmental conditions; it contracts with the subsequent stimulation of the nerve fibers by pressure changes in the tubules. Although this theory never has gained many supporters, it cannot be denied as a possible explanation because the mere presence of nerve fibers in connection with the base of the Tomes' fibers in the predentin does not eliminate such a conjecture.

The neurosensory, gustatory terminations among the gustatory cells of the taste buds, the hair cells of the cochlea, the rod and cone cells of the retina, and the nerve terminations in all varieties of epithelia in which the fibers are characteristically varicose and terminate by minute knoblike enlargements in contact with the epithelial cells have an arrangement analogous to such a dental arrangement. The analogy is not complete, however, since the nerve fibers seem to end in the tooth, that is, on the Tomes' fibers. This, of course, in the case of a withdrawing cell is the only way the nerve fibers can end. Since the odontoblast subserves two functions, each may be relegated to a specific portion of the cell as a whole. Nevertheless, the trophic role the odontoblast plays in maintaining the dentin cannot be discounted.

Other analogous situations are observed in the connective tissues of the body. Meissner's corpuscles and pacinian corpuscles have comparable relations. The neuromuscular spindles and neurotendinous end-organs are other similar sensory receptor mechanisms in muscles and tendons.

As the consequence of irritation from caries, erosion, abrasion or attrition, with or without the crowding of odontoblasts in the pulpal horns, the odontoblastic processes disintegrate. The pulpal openings of the dentinal tubules are then sealed off by a deposit of irregular dentin, and the tubules become filled with the debris of the degenerated Tomes' fibers and gaseous substances. Aggregates of tubules so altered, termed "dead tracts,"[27] form regions of decreased sensitivity.[27, 28]

Another phenomenon occurs in the dentin on exposure to abrasion or erosion and as a consequence of age. The tubular contents become calcified and form

21. Stewart, D. The problem of the innervation of the dentine. J. Anat. 61:439 July 1927.

22. Stewart, D. Further observations on the innervation of the teeth and the fibers of Mummery. J. Anat. 63:1 Oct. 1928.

23. Bevelander, Gerrit, and Johnson, P. L. Odontoblasts and dentinogenesis. J. D. Res. 25:381 Oct. 1946.

24. Bödecker, C. F. W. Anatomy and pathology of the teeth. Philadelphia, S. S. White Dental Manufacturing Co., 1894.

25. Bödecker, C. F. W. The minute anatomy, physiology, pathology and therapeutics of the dental pulp. D. Cosmos 24:292 June 1882.

26. Gysi, Alfred. An attempt to explain the sensitiveness of dentine. Brit. J. D. Sc. 43:865, 1900.

27. Fish, E. Wilfred. An experimental investigation of enamel, dentine, and the dental pulp. London, John Bale, Sons & Danielson, 1932.

28. Thomas, B. O. A. Protective metamorphosis of the dentin: its relationship to pain. J.A.D.A. 31:459 April 1944.

sclerotic dentin or transparent dentin. Calcium salts are deposited in and around the degenerating Tomes' fibers; hence, the tubules may become obliterated. The end result of such a reaction is a decrease or a loss of sensitivity on the part of the dentin so affected.[29-31]

As a protection against exposure of the pulp by abrasion and erosion and against injuries to the dentinal fibrils, the tooth reacts by producing a deposit of irregular secondary dentin on the pulpal surface of the dentin. The number of odontoblasts and Tomes' fibers in this region is reduced; this reduction brings about a proportionate decrease in the sensitivity of this dentin.[32]

Another clinical consideration which can be reconciled with this possible mode of sensory reception in the tooth is hypersensitivity in dentin. At the dentinoenamel junction there is a high degree of sensitivity, which can be attributed to the crossing over of the dentinal tubules, the dentinal spindles and the greater branching of the dentinal tubules.[33] In the dentin of the root of the tooth underlying the cementum is the granular layer of Tomes', which is composed of minute regions of interglobular dentin. There is an extensive branching and anastomosis of the Tomes' fibers at this region, which are typical of the dentin of the root; hence, clinically evident hypersensitivity can be substantiated.[34]

Most of the work that has been done on this problem was performed at a time when nerve-staining technics were not reliable tools. Even today with refined technics and stains, caution must be observed in the interpretation of the results. A glance at many of the photomicrographs used in the past makes the conclusions appear debatable. In many cases the silvering methods employed were of such a nature that accurate results were impossible. Usually the stained section was a dense, black blotch; but on the basis of such material and results, the investigators claimed to have traced nerve fibers to all points in the pulp and dentin. With few exceptions, in almost every paper that has been presented, histologic material was unsatisfactory. Yet article after article has appeared in journals substantiating this or that claim, based on what must be regarded as inadequate staining.

CONCLUSIONS

From a study of histologic material prepared with the silver-peptone stain, the following conclusions can be drawn:

1. The human tooth is generously innervated. The nerve fibers occupy the major portion of the pulp tissue in the root canal, in which they pass as a single, large bundle; as they reach the main pulp chamber, smaller bundles are progressively formed.

2. The plexus of Raschkow does not exist. Nerve fibers proceed directly into the odontoblastic layer from a pulpal nerve bundle, rather than from a subodontoblastic plexus.

3. The nerve fibers pass between the odontoblasts and enter the predentin.

4. The nerve fibers are restricted to the predentin and do not invade the fully calcified dentin.

5. In the predentin a nerve fiber follows both an intratubular and an extratubular course, changing from one position to the other. The extratubular por-

29. Beust, Theodore B. Reactions of the dentinal fibril to external irritation. J.A.D.A. 18:1060 June 1931.

30. Kronfeld, Rudolf. Histopathology of the teeth and their surrounding structures, ed. 3. Philadephia, Lea & Febiger, 1949.

31. Thomas, B. O. A. Gerodontology: the study of changes in oral tissues associated with aging. J.A.D.A. 33:207 Feb. 1946.

32. Black, A. D. G. V. Black's Work on operative dentistry, vol. 4. Chicago, Medico-Dental Publishing Co., 1936.

33. Noyes, F. B., and others. Oral histology and embryology, ed. 6. Philadelphia, Lea & Febiger, 1948.

34. Bodecker, Charles F. Fundamentals of dental histology and embryology. New York, Macmillan Co., 1926.

tions of the nerve fiber pass in every direction throughout the predentinal matrix, bending, looping and swerving between the dentinal tubules.

6. The agent by which sensory stimuli are received is the Tomes' fiber, which transmits the stimulation to the predentinal nerve fibers in contact with the Tomes' fibers. This relation is consistent with what is observed among specialized nerve endings in other parts of the body.

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Evaluation of deciduous molars treated by pulpotomy and calcium hydroxide

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Treatment by pulpotomy and capping of the remaining pulp tissue with calcium hydroxide has been demonstrated to be the method most likely to preserve the health and function of deciduous and young permanent teeth with exposed vital pulps. An investigation has been undertaken to evaluate this treatment through a study of the postoperative roentgenograms of a number of treated teeth.

REVIEW OF LITERATURE

In 1939, Teuscher and Zander[1] reported a study of the reaction of the pulp to calcium hydroxide. Pulpotomies were performed on a series of teeth which then were capped with calcium hydroxide. The teeth were removed after a period of time and studied histologically. It was found that the odontoblasts had proliferated over the pulpal stumps beneath the layer of calcium hydroxide, and a layer of dentin had formed completely capping the remaining pulp tissue. The pulp tissue in the root canals, apical to the layer of newly formed dentin, appeared normal. The investigation led to the development of the pulpotomy technic, with calcium hydroxide as the capping material, for the treatment of deciduous and young permanent teeth with exposed pulps.

Brown,[2] in 1947, reported a clinical study of 92 teeth on which pulpotomies had been performed and to which calcium hydroxide had been applied. The technic used to perform the pulpotomies in Brown's study and the present investigation follows:

1. The tooth was anesthetized in the usual manner, except when it was found necessary to reinforce the anesthetic by injection directly into the pulp chamber.

2. The tooth was isolated by means of a rubber dam.

Department of dentistry, Henry Ford Hospital.

1. Teuscher, George W., and Zander, Helmut A. A preliminary report on pulpotomy. Northwest. Univ. D. Res. & Grad. Quart. 39:4-8 Dec. 5, 1938.

2. Brown, W. E., Jr. The vital pulpotomy technic for the management of vital exposed pulps in primary and young permanent teeth. Thesis, University of Michigan.

3. The tooth and the region of rubber dam surrounding it was swabbed with tincture of mercocresols. The working points and cotton swabs were sterilized.

4. The tooth was opened wide to expose the entire roof of the pulp chamber, a sterile bur was selected and the contents of the pulp chamber were removed.

5. The pulp chamber was swabbed with a cotton pellet having a trace of phenol on its surface.

6. Occasionally it was necessary to control hemorrhage by placing a cotton pellet saturated with phenylephrine (1 per cent) or epinephrine (1:500) over the floor of the pulp chamber.

7. The amputation stumps were covered with a paste made of calcium hydroxide and sterile water.

8. A cement base and metallic filling usually were placed over the calcium hydroxide immediately.

Brown found that the treatment was successful in 90.2 per cent of the cases, with a standard error of 3.1 per cent. His investigation was based on a sample of deciduous and permanent maxillary and mandibular teeth. There were 20 permanent teeth and 72 deciduous teeth, of which 25 were in the upper arch. The treated teeth were observed from 4 months to 47 months.

Brown made tests to find out whether preoperative reaction, the size of the area of exposed pulp, the quantity of hemorrhage or the maintenance of asepsis were factors which influenced the outcome of the treatment. The chi square tests run on these factors showed that maintenance

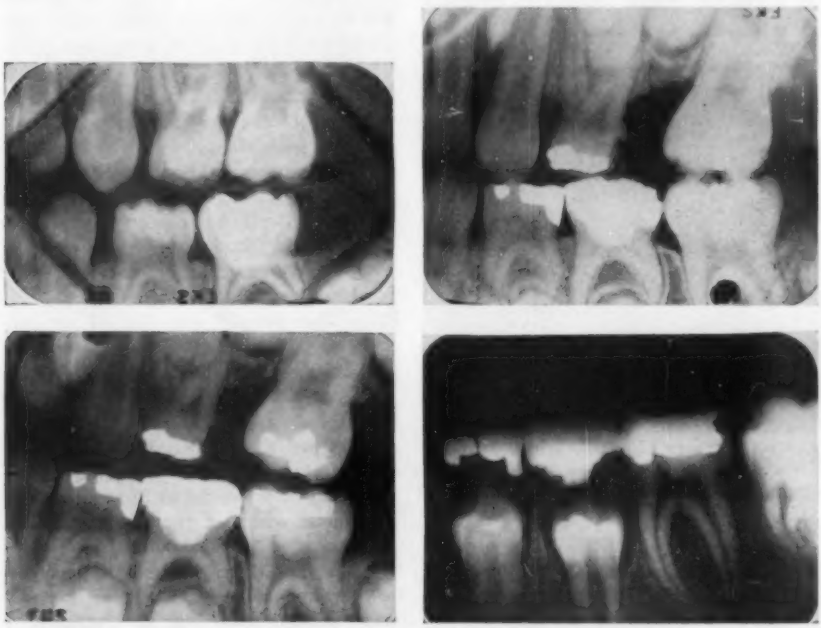

Fig. 1 • Successfully treated lower right second deciduous molar. Above left: November 29, 1946. Above right: September 21, 1949. Below left: September 22, 1950. Below right: June 24, 1953

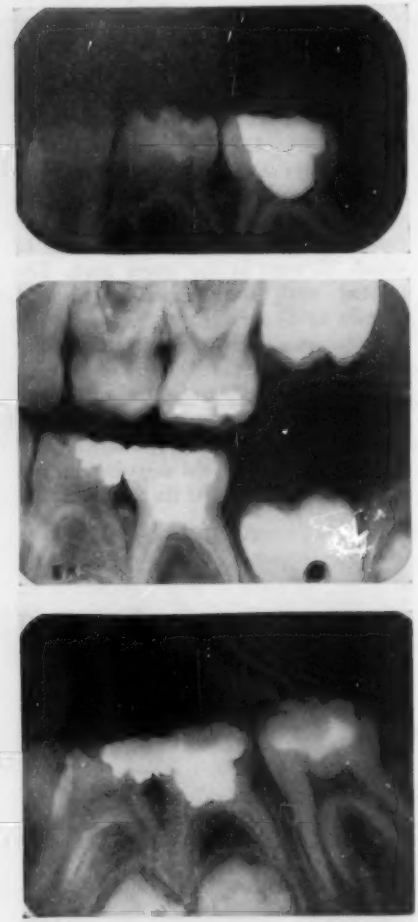

Fig. 2 • Successfully treated lower right second deciduous molar. Above: March 14, 1950. Center: February 15, 1952. Below: June 24, 1953

of asepsis and quantity of hemorrhage were not statistically significant as factors which influenced the outcome of the treatment. Preoperative reaction and size of the area of exposed pulp approached the level of statistical significance, and it was suggested that these tests be repeated on a larger sample to prove or disprove their influence on the outcome of the treatment.

PRESENTATION OF DATA

The procedure followed in the present investigation was to select a sample from the 800 records of pulpotomies on file at the children's clinic of the School of Dentistry of the University of Michigan. All of these teeth were treated with the same technic. Care was exercised to prevent deviation from this technic. Over 50 per cent of the treatments were performed by instructors, postgraduate or graduate students; the rest were completed by senior dental students under the supervision of an instructor.

The criteria for selecting the sample were as follows:

1. The sample was limited to deciduous molars in the mandibular arch. This limitation was made to avoid any possible misinterpretation of the roentgenogram because of the superimposition of other structures generally found in conjunction with the roots of the maxillary deciduous molars. The data for 17 permanent teeth were collected, but because of the small number of permanent teeth available for study, they were neither evaluated separately, nor included in the total sample.

2. The sample was limited to only those treated teeth in which postoperative roentgenograms were secured after sufficient time had elapsed to determine whether the treatment could be judged a success or a failure. The treatments judged successful were evaluated within the range of 9 months to 72 months. The arithmetic mean of the length of these postoperative evaluations was 24.8 months. The distribution of the successful treatments was as follows: 1 treatment judged successful at 9 months, 4 treatments at 10 months, 4 treatments at 11 months, 3 treatments at 12 to 18 months and 20 treatments at 18 to 72

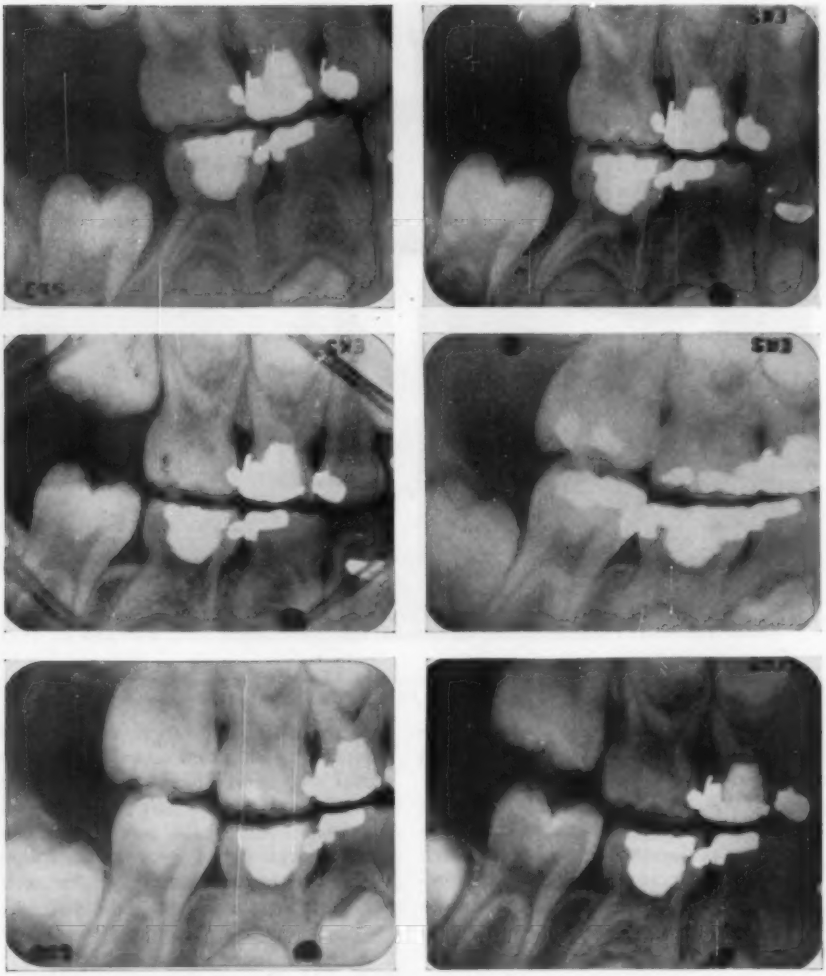

Fig. 3 • Lower left second deciduous molar with repaired internal resorption. Above left: May 28, 1948. Above right: September 17, 1948. Center left: September 22, 1949. Center right: March 10, 1950. Below left: September 19, 1951. Below right: January 15, 1952

months. An obvious failure, of course, can be determined in a much shorter time than a success. The last postoperative roentgenograms of teeth for which treatment failed were secured at an average of 15.8 months after the treatment and within the range of 3 to 48 months.

3. A small number of treated teeth which were obvious failures from the start because of faulty diagnosis of the

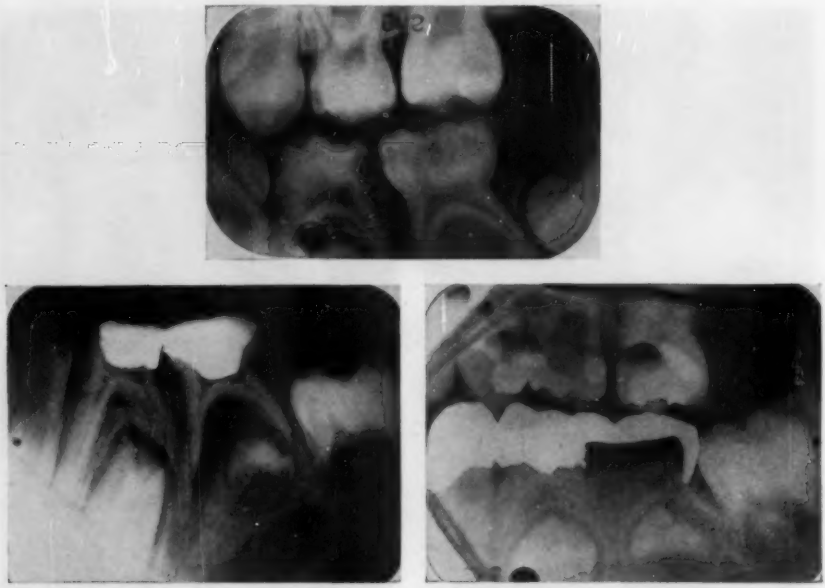

Fig. 4 • Treated lower right second deciduous molar. Note loss of periradicular bone. Above: September 21, 1950. Below left: November 7, 1951. Below right: February 24, 1953

health of the pulp at the time the pulpotomy was performed were not included in the sample.

4. Those deciduous teeth which were shed less than one year after the pulpotomy was performed were also excluded.

For the purpose of clarity and the prevention of misunderstanding, it seems appropriate that certain terms used throughout this report should be defined.

Success • The treatment of a tooth by pulpotomy and calcium hydroxide was judged successful if the tooth exhibited roentgenographic evidence of a normal width for the periodontal membrane about all roots and a normal lamina dura and alveolar process surrounding the roots one year after the treatment. The treated tooth also had to exhibit roentgenographic evidence of a dentinal bridge with normal calcification of the root canals in all roots and no evidence of internal resorption (Fig. 1 and 2). One exception was made; eight teeth were judged successful that showed roentgenographic evidence of internal resorption which had been repaired by bone or a cementumlike tissue and displayed normal periradicular structures (Fig. 3).

Failure • The treatment of a pulpotomized tooth with calcium hydroxide was judged a failure if there was roentgenographic evidence of loss of periradicular bone about one or more roots, unrepaired internal resorption or absence of a dentinal bridge in one or more root canals (Fig. 4-7).

The sample for this investigation, selected in accordance with the criteria previously described, was composed of

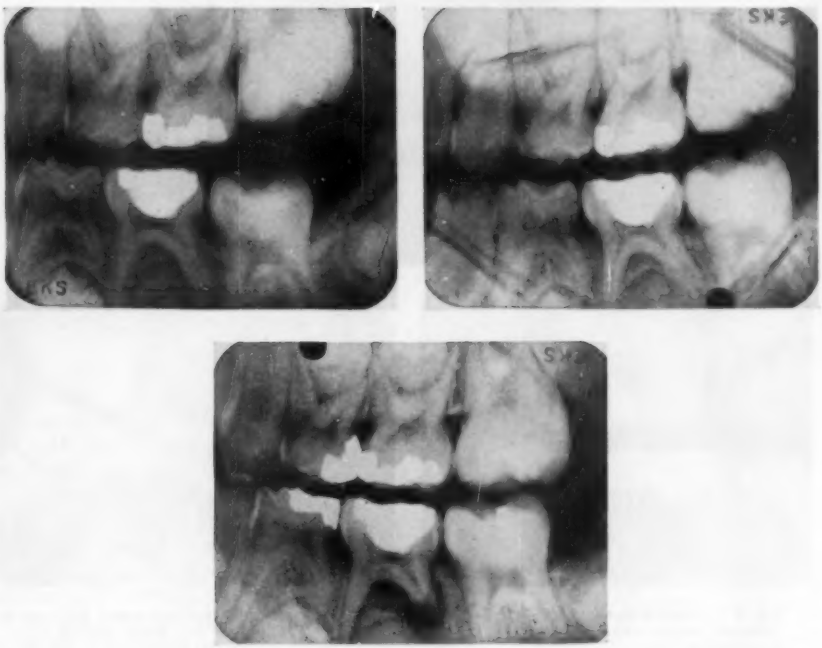

Fig. 5 • Treated lower right second deciduous molar. Note abnormal root resorption and loss of periradicular bone. Above left: May 29, 1945. Above right: October 4, 1945. Below: September 21, 1946

103 deciduous molars. The records and roentgenograms of the teeth comprising the sample were studied and a master table of data was constructed to include the following: the number assigned to the treated tooth, the patient's age, the position number of the tooth in the arch, the preoperative reaction, the time which had elapsed since the pulpotomy, roentgenographic evidence of the formation of a dentinal bridge, the size of the area of pulp exposed, the presence of internal resorption, the loss of periradicular bone and the judgment of the investigator regarding the success or failure of the treatment. The table is not included in this report because of its length; however, a table is presented showing factors influencing the outcome of treatment and the percentage of success.

EVALUATION OF DATA

Some of the data presented previously in this report were adaptable to statistical analysis.

First to be considered was the percentage of the total teeth on which successful operations were performed. Treatment on 32 teeth was judged to be successful and on 71 teeth was judged to be a failure. Success was achieved, therefore, with 31.1 per cent of the teeth, and the treatment failed with 68.9 per cent of the teeth. The standard error was calculated and found to be 4.56 per cent.

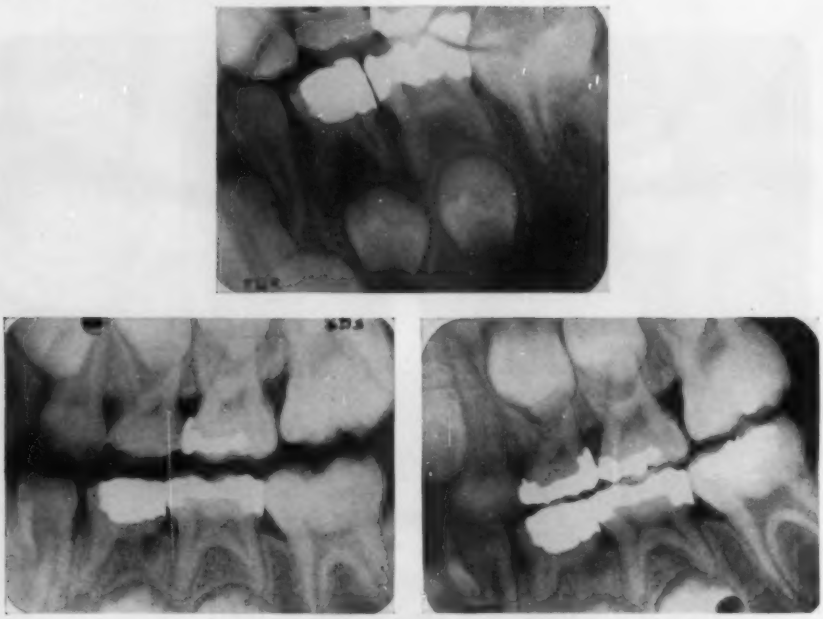

Fig. 6 • Treated lower right first deciduous molar. Note internal resorption and absence of dentinal bridge. Above: May 19, 1950. Below left: September 10, 1950. Below right: January 19, 1951

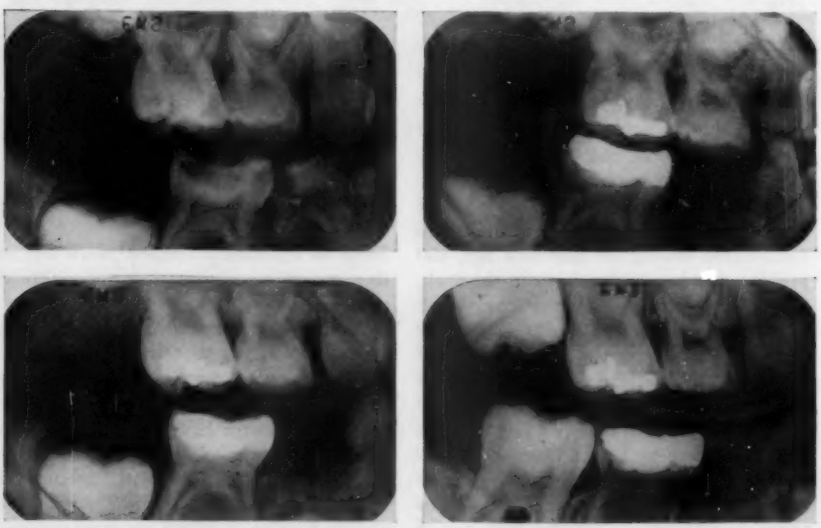

Fig. 7 • Treated lower left second deciduous molar. Note progressive internal resorption after formation of dentinal bridge. Above left: April 14, 1945. Above right: May 31, 1945. Below left: November 3, 1945. Below right: September 4, 1946

Using 2 standard errors, equal to 2 sigma distances on the normal curve, it may be expected that in repeated samples such as the one observed, the percentage of failures might be between 58.8 per cent and 78.0 per cent in 95 samples out of 100.

Of the 71 teeth on which treatment had failed, 48 exhibited internal resorption with or without periapical involvement. This finding indicates that 68.9 per cent of the total teeth on which treatment had failed showed internal resorption.

The standard error was 5.25 per cent; therefore, it may be expected that in 95 instances out of 100, 58.4 per cent to 79.4 per cent of the unsuccessfully treated teeth might exhibit internal resorption.

As suggested by Brown,[2] the presence or absence of a preoperative reaction and the size of the area of exposed pulp as factors in success or failure were subjected to statistical analysis. On the advice of a statistician,[3] it was decided that a chi square test would be useless on these data, because the difference between the percentage of success and the presence or absence of preoperative reaction and the size of the area of exposed pulp was less than 5 per cent.

Injection of anesthetic directly into the pulp chamber also was studied statistically to determine whether or not it was a factor in the success or failure of the treatment. Since the observed difference between success with and without injection was 11 per cent, these data were subjected to a chi square test which showed that the association between success and injection of the pulp was due to the operation of chance more than 25 per cent of the time. The 11 per cent observed difference between success when anesthetic was injected directly into the pulp and success without the necessity for injection was clearly not statistically significant, but could be due to chance.

Two teeth exhibiting roentgenographic evidence of internal resorption were submitted to an oral pathologist for study. For one tooth, he reported as follows:

> Old purulent pulpitis is present in the coronal area. Other regions show marked fibrosis. There are numerous giant cells with active resorption and a small region of metaplastic dentin formation.[4]

For the second tooth, he reported:

> This tooth shows irregular root resorption. The residual portion of the coronal part of the pulp chamber shows active chronic inflammation with fibrosis and loss of the odontoblastic layer. There is resorption of dentin, and some giant cells are present. At the junction between coronal and radicular portions of the pulp, there is a layer of atypical dentin with irregular calcification. This layer extends along the pulp wall to the apex and completely fills one upper half of the canal. In

Table • Factors influencing outcome of treatment
Number of teeth treated and percentage of success

	Successes	Failures	Total cases	Percentage of success
Total teeth	32	71	103	31
Preoperative reaction				
Present	9	19	28	32
Absent	23	51	74	31
No report	0	1	1	
Anesthetic injected into pulp				
Present	7	24	31	22
Absent	24	47	71	33
No report	1	0	1	
Amount of pulp exposed				
Small	22	52	74	29
Large	7	19	26	27
No report	3	0	3	
Internal resorption				
Present	0	48	48	
Absent	24	14	38	
Repaired	8	0	8	
No report	0	9	9	
Loss of periradicular bone*				
Present	0	48	48	
Absent	32	14	46	
No report	0	9	9	

*Abnormal root resorption included.

3. Johnson, Helen. Personal communication, July 9, 1953.

4. Kerr, D. A. Personal communication, Oct. 20, 1952.

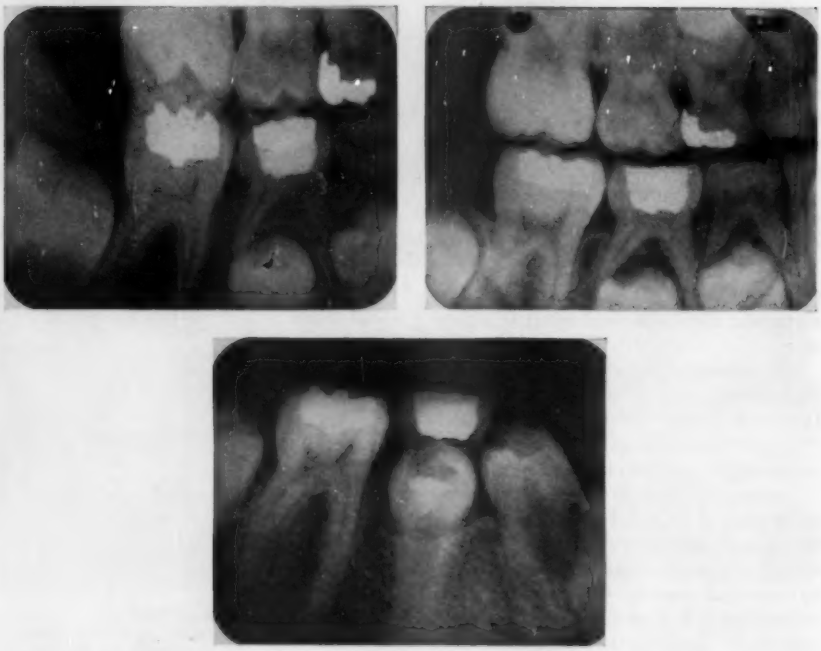

Fig. 8 • Unerupted bicuspid with resorbed crown after pulpotomy performed on lower left second deciduous molar. Above left: January 24, 1951. Above right: September 19, 1951. Below: June 24, 1953

this region, the odontoblasts are flat and resemble osteoblasts in character.[4]

In one instance, resorption of the crown of the unerupted permanent tooth beneath a deciduous tooth on which a pulpotomy had been performed was observed (Fig. 8). Since such resorption was seen in only one instance of all the pulpotomies studied, its presence was not considered significant.

The reasons for the high rate of failure in this sample are left to conjecture, since none of the factors thought to influence the outcome can be proved statistically to have any effect on success or failure.

It is possible that the condition of the pulp at the time of operation with respect to its inherent resistance and the amount of damage suffered from irritating agents produced by carious lesions is the major factor that determines whether the treatment will be successful or will fail. One may conclude that the most important factor in increasing the chance of success is the determination of the exact condition of the pulp tissue at the time of the operation. Such a determination, however, is almost impossible to accomplish clinically. Brown[3] found no significant correlation between the clinical signs and factors of preoperative history, and none was found in this present study. The foregoing statement should not be construed to mean that clinical signs are not valuable factors in the selection of teeth for treatment by pulpotomy. Many teeth are eliminated from treatment on

the basis of the clinical signs of pulpal disease.

SUMMARY

One hundred and three pulpotomized deciduous molars treated with calcium hydroxide were studied by roentgenograms for an average period of 24.9 months. Certain factors which might have affected the success or failure of the treatment were tested statistically. None of these factors was found to have a valid influence in the sample tested.

An analysis of the unsuccessfully treated teeth indicated that 68.9 per cent showed internal resorption. Of these, 14.4 per cent were designated as successful because the resorption was repaired by a calcified tissue and the tooth was maintained in the arch. Two teeth displaying roentgenographic evidence of internal resorption were studied microscopically, and the presence of abnormal resorption of the walls of the pulp chamber was confirmed.

The presence of a preoperative reaction, a large area of exposed pulp and injection of anesthetic directly into the pulp tissue was evaluated statistically, and it was found that there was no evidence of any relation between these factors and success or failure, except that which existed through chance.

Treatment was judged to have failed in 68.9 per cent of the total number of teeth studied. Since this finding is not in accord with those of other investigators,[1, 2, 5, 6] it is hoped that an investigation will be designed to eliminate many of the human factors in recording which may have influenced the results of this investigation.

5. Hess, Walter. Treatment of teeth with exposed healthy pulps. Internat. D. J. 1:10 Dec. 1950.

6. Glass, R. L., and Zander, H. A. Pulp healing. J. D. Res. 28:97 April 1949.

Scientific Manpower • We must undoubtedly hold that if a larger supply of talent exists than is discovered, developed and put to use that, since, as we have seen, it is so valuable when estimated in terms of social progress, we are dealing wastefully with talent. We are allowing great ability to go to waste since we are leaving it lie in its undeveloped form. Therefore one of the problems of the proper conservation of talent consists in finding a method of discovering and releasing this valuable form of social energy. . . .

We shall be wise when we realize the worth of our workable talent and so establish its working conditions that it may secure the full measure of its productiveness. If scientific management for the mass of laborers of a nation is worth while how much more serviceable would it be to extend its fructifying influence to the most able members of the community. *John M. Gillette, "The Conservation of Talent Through Utilization," The Scientific Monthly 1:151, 1915.*

A preliminary report of photoelastic tests of strain patterns within jacket crowns

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It is a well-known fact that jacket crowns sometimes fracture from apparently normal use. The types of fractures—the longitudinal split of the crown and the crescent-shaped fracture in the labiogingival or linguogingival regions — are familiar to all dentists. The purpose of the present study was to determine the causes of such fractures by analyzing the regions of strain within jacket crowns subjected to a load.

The external shape of the jacket is determined by tooth form and physiological requirements, but the core or supporting tooth substance can be modified within certain limits to achieve two essential requirements: stability and strength. If the crown is to have stability, it must not rotate, twist or deform excessively under tooth loads. Stresses in the crown must be low enough to prevent fracture due to tooth loads.

Obviously, the core design must be a compromise between the shapes demanded by the two requirements of stability and strength. From the standpoint of stability, a cross section of the core should be rectangular with sharp corners; but from the standpoint of strength, a cross section of the core should be round or oval-shaped or at least rectangular with generously beveled or rounded line angles.

It was decided, therefore, that if a large plastic prototype of a jacket was loaded on an appropriate core and then sectioned, it would be possible by viewing the sections under polarized light to find the precise regions of detrimental strains. Certain changes in the shape of the core could then be made to reduce these strains and thus reduce the incidence of fracture of jacket crowns.

EXPERIMENTAL PROCEDURE

Photoelastic tests employing the method of "freezing" and "slicing"[1] were used to determine the strains existing in a jacket crown under the action of tooth loading. In these photoelastic tests a plastic that is photoelastically sensitive is subjected to a load at an elevated temperature.[2] The temperature is gradually reduced while the load remains until room temperature is attained. The load is then released, and the strains that have developed within the plastic are retained or "frozen" within the specimen.

The specimen is then sectioned for three-dimensional analysis. These sections

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*Physicist, Westinghouse Electric Research Laboratories, East Pittsburgh, Pa.

1. Hetenyi, M. The fundamentals of three-dimensional photoelasticity. J. Applied Mechanics Dec. 1938.

2. Leven, M. M. A new material for three-dimensional photoelasticity. Proc. Soc. Experimental Stress Analysis 6:19 No. 1.

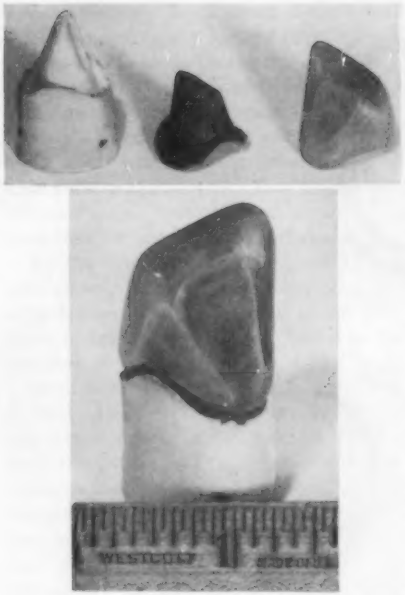

Fig. 1 • Plastic jacket prototype. Above left: Artificial stone inner core. Above center: Latex cover for inner core. Above right: Fosterite jacket, lingual view. Below: Assembled jacket on core

are viewed by transmitted polarized light in a polariscope, and the points of strain are photographed and analyzed to determine their magnitude.

In determining the magnitude, the number of curved bands or "fringes" that radiate from a region of strain is counted. These "fringes" are seen as dark bands in monochromatic light and as bands of yellow, red and green in white light. The number of "fringes" is multiplied by a calibration constant known as the fringe value of the particular plastic, and the magnitude of the strain is determined for the point.

Auxiliary tests can be made to ascertain whether the stresses are tensile or compressive stresses. Porcelain is a material which is extremely resistant to compression but weakened by tensile stress. The tensile stresses, therefore, are of special interest.

A prototype of a porcelain crown on a dentin core should be made of materials which have the same modulus of elasticity ratio as that which exists between porcelain and dentin, that is, about 9,000,000 psi to 1,300,000 psi. The crown models for this study were made of Fosterite, a resin of the styrene-alkyd class developed by Westinghouse for photoelastic analysis. The modulus of Fosterite at 90° C. is about 1,600 psi. Since no suitable plastic with a low enough modulus, that is, 225 psi, was available for the core, a latex covering over the core was used to obtain the desired flexibility.

Jacket crown models were carved from solid pieces of Fosterite as shown in Figure 1, above right. The cores were of two types: (1) a cast core of artificial stone (Fig. 1, above left), covered with a thin, .04 inch, latex covering (Fig. 1, above center); and (2) a core carved of Fosterite with a thick, .08 inch, latex cover, punched with a number of small holes. Figure 1, below, shows the complete jacket assembly, the components of which are shown in Figure 1, above.

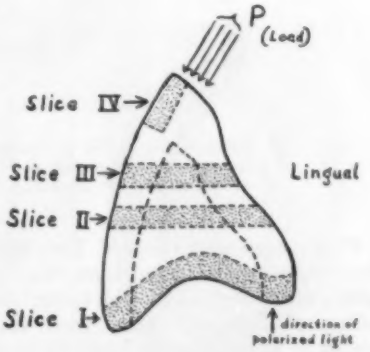

Fig. 2 • Locations of slices into which each jacket crown model was sectioned. P indicates direction and position of load

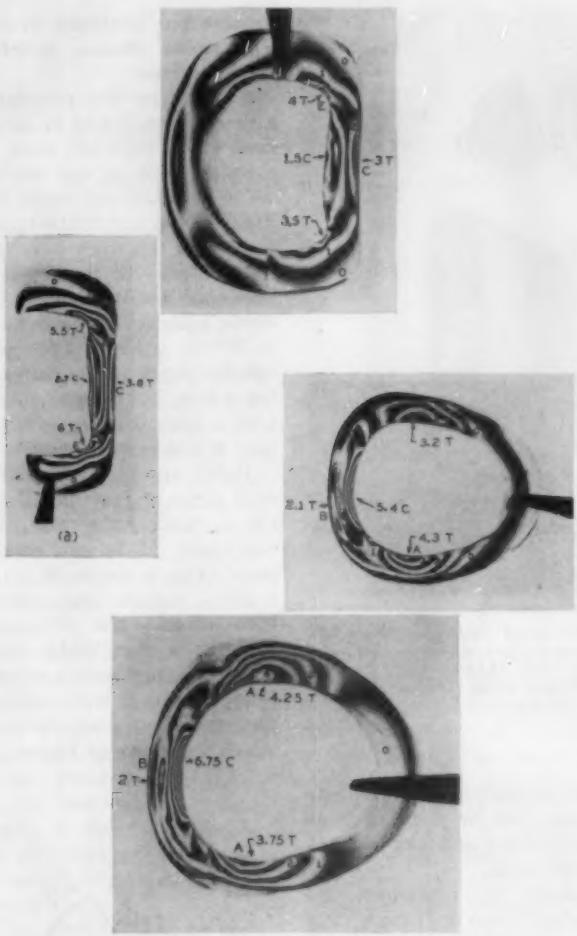

Fig. 3 • Left: Slice 2, Crown 1, lingual section. Above: Slice 2, Crown 4, lingual section in focus. Right: Slice 1, Crown 1, gingival section. Below: Slice 1, Crown 4

Four models were analyzed. They were first loaded on the incisal edge (Fig. 2) with a distributed load acting toward the labiogingival region. They were then placed in an oven under load; the temperature of the oven was raised to about 90° C. The temperature was gradually lowered, and at room temperature the load was released. The models were then ready for sectioning.

Figure 2 shows the locations of the slices into which each jacket crown was sectioned. Jackets 1 and 4 were similar in form and thickness; Jacket 1 had an artificial stone core and a thin latex cover; Jacket 4 had a Fosterite core and

a thick punched latex cover. Both 1 and 4 had symmetrically formed cores.

Jacket 2 was a much thicker crown than Jackets 1 or 4, but its core material was similar to that of Jacket 4. The core form was symmetrical. Jacket 3 had a stone core with a latex cover, but the core form was eccentric; that is, the distoincisal angle was reduced so that the core had an irregular conical shape.

In the photographs of Figure 3, left and above, Jackets 1 and 4—similar except for core softness—show strain patterns in comparable regions, but a larger number of fringes are present in Crown 1 because of its more resistant core (Fig. 3, left). These fringes indicate great tensile strains on the axiolingual line angles near the incisal border, where the preparation supports them. Significant tensile strains are evident also in the outer portion of the lingual surface of Crowns 1 and 4 (Fig. 3, left and above); these strains are present also in the proximal shoulders at the height of the gingival festoon as shown in the no. 1 slices of Crowns 1 and 4 (Fig. 3, right and below).

In Slice 1 of each crown there is evidence of heavy compressive stress on the inner part of the labial shoulder. The outer shell of the crown in this region indicates some relatively insignificant tensile strain.

The photographs of slices in Crown 2, the crown with the thicker walls and large fillets in the axioline angles, show fewer fringes in all regions (Fig. 4, left). Therefore, this crown has greater strength than Crowns 1 or 4 (Fig. 4, center and right).

Photographs of the slices of Crown 3, the crown with the eccentric core, show few fringes in the gingival and middle sections (Fig. 5, left and center) of the crown. Nearer the incisal region, however, the tensile stresses build up, and there is a pattern of concentrated tension at the apex of the core (Fig. 5, right). This pattern of tension suggests the vulnerability of such a crown to longitudinal fracture.

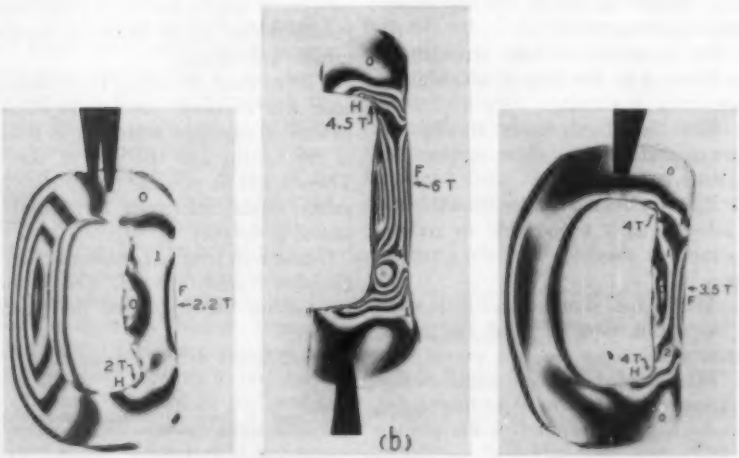

Fig. 4 • Left: Slice 3, Crown 2, lingual section in focus. Center: Slice 3, Crown 1. Right: Slice 3, Crown 4, lingual section in focus

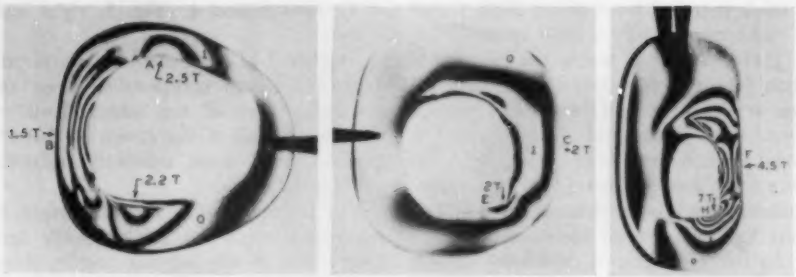

Fig. 5 • Left: Slice 1, Crown 3, lingual section in focus. Center: Slice 2, Crown 3, lingual section in focus. Right: Slice 3, Crown 3, bearing stress on linguoincisal angle of core

CONCLUSIONS

1. The thicker the walls of the jacket, the greater is its strength. Stability, retention, danger to the pulp and weakening of the dentin core were disregarded in this test, but must be considered in practice.

2. Greater strength of the jacket is obtained by providing a generous bevel of the linguoproximal line angles on the preparation and by preventing thus sharp angles within the crown. Such angles can develop great tensile strains in upper anterior jackets.

3. For porcelain to have strength, it must be thick in the lingual articulating region.

4. The labial shoulder should be square or preferably acute to support the compressive stress.

5. The proximal shoulder should be as flat labiolingually as possible to reduce the strains at the height of the gingival festoon.

6. The lingual shoulder has little relation with this type of load on upper anterior teeth.

7. Maximum mesiodistal width of the preparation is important. The strains developed at the incisal end of the preparation with the eccentric core were about twice as great as those of the preparation with a symmetrical core.

COMMENT

The method of fabrication of these test crowns was laborious, and it was difficult to duplicate the crowns. Tests with photoelastically sensitive plastics that can be cast in an unstrained form are now being made. If the tests are successful, it is hoped that these experiments will be continued until core forms have been so modified that tensile strains in completed crowns are reduced.

The method of casting both jacket and core will make it possible to duplicate exactly dimensions such as the thickness of the crown and the size of the core. Then it will be possible to evaluate accurately modifications in form and substance of the core.

These tests tend to corroborate the conclusions reached by H. Conod in his treatise on the statics of the porcelain jacket.[3]

515 South Aiken Avenue

3. Conod, H. Étude sur la statique de la couronne jaquette. Actualités odontostomatol., Paris 14:193, 1951.

Recovery of tubercle bacilli from mouth washings of tuberculous dental patients

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The frequency with which living tubercle bacilli occur about the site of dental procedures is a matter of practical importance to dentists, dental hygienists and dental technicians who work with tuberculous patients. The organisms have been recovered from swabs or washing of the lips, gingiva, teeth, and oral mucous membranes of sanatorium patients by a number of investigators, but the reported frequency of their occurrence varies greatly, depending on the stage of activity of the disease, the method of obtaining test materials, and the technics used to demonstrate tubercle bacilli. Gloyne[1] found acid-fast bacilli in smears obtained from the mouths of 10 out of 20 patients with chronic pulmonary tuberculosis. By the method of inoculating animals, Gulbrandsen and Keller[2] recovered tubercle bacilli from 54 out of 64 lip swabs taken at different intervals from nine tuberculous patients. Dubois-Verlière[3] studied the presence of tubercle bacilli in mouth swabs and washings of 68 patients with pulmonary tuberculosis. He prepared cultures at hourly intervals after each patient's last expectoration and found 54 per cent positive at one hour, 36 per cent at two hours, 22 per cent at three hours, 11 per cent at four hours, 16 per cent at five hours and 21 per cent after an interval of 6 to 10 hours. Duguid[4] reported that "tubercle bacilli were found to be present in the secretions of the throat of 15 out of 20 patients and in the secretions of the anterior mouth of 10 out of 20 patients." After reviewing the literature on this subject, Appleton[5] concludes that "tubercle bacilli may occasionally be found in the mouths of tuberculous patients."

In an effort to assess the degree to which tubercle bacilli occur at the operative site, smears and cultures were prepared of a sample of water syringed over the dental surfaces during the course of 300 consecutive dental procedures performed on 111 tuberculous patients treated in a sanatorium dental clinic. Each of these patients had presented roentgenographic evidence of active pulmonary tuberculosis prior to admission to the hospital, and tubercle bacilli were recovered from the sputum of each at some time during the course of hospitali-

From the laboratory and dental services of the Veterans Administration Hospital.

1. Gloyne, S. R. Buccal infection with B. tuberculosis. Tubercle 3:497 Aug. 1922.

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4. Duguid, J. P. Expulsion of pathogenic organisms from the respiratory tract. Brit. M.J. 1:265 Feb. 23, 1946.

5. Appleton, J. L. T. Bacterial infection with special reference to dental practice, ed. 4. Philadelphia, Lea & Febiger, 1950.

Table • Results of tests on mouth washings of dental patients

Test method	Positive No.	Positive %	Negative No.	Negative %	Unsat. No.	Unsat. %
Smear	26	8.7	260	86.7	14	4.7
Culture	131	43.7	161	53.7	8	2.7

zation. Mouth washes were taken when the patients first entered the dental clinic. No distinction was made as to whether they had natural or artificial dentition or were totally lacking in teeth, and no changes were made in their normal oral hygiene habits. The distribution of dental operations performed on this group of patients was as follows: oral examinations, 81; operative dentistry, 92; minor oral surgery, 21; prosthodontic, 76; oral prophylaxis, 2; and periodontal treatment, 7. All the 111 patients had mouth washes taken on their original visit; 27 had mouth washes taken on two occasions and 46 on more than two occasions.

COLLECTION OF SPECIMENS

Each patient was given a sterile wide-mouth, screw-cap, half-pint jar. Water delivered from the nozzle of a syringe attached to the dental operating unit was sprayed over the surfaces of the teeth and gingiva at intervals during the dental treatment and was collected in the jar rather than being expectorated into the cuspidor. If the patient coughed or otherwise raised material from the pharynx or lower respiratory tract, he expectorated into the cuspidor, not into the specimen jar. The specimens had an average volume of 15 to 20 ml., and the gross appearance of the great majority was clear and watery. Multiple samples of water collected from the dental unit syringe attachments at intervals during the course of this study were tested for mycobacteria in the same manner as the mouth washings.

PROCESSING AND TESTING OF SPECIMENS

Each specimen was delivered promptly to the laboratory and examined by the following method:

1. An equal volume of 4 per cent sodium hydroxide was added and the specimen was homogenized for 15 minutes in a three-dimensional shaking machine.

2. A 20 ml. aliquot was transferred to a sterile screw-cap centrifuge tube and concentrated by centrifugation at 3,000 rpm (1,500-1,800 relative centrifugal force) for 15 minutes in an angle-type centrifuge.

3. The supernatant fluid was decanted, and the sediment neutralized to approximately pH 7 with hydrochloric acid 0.1 Normal to 1 Normal in the presence of phenol red indicator.

4. One hundred units of penicillin were added to the neutralized concentrate.

5. Each concentrate was seeded on three tubes of modified Lowenstein-Jensen solid medium and smears were prepared for staining by the Ziehl-Neelsen technic.

The cultures were incubated at 37°C. for eight weeks and were examined at four and eight weeks. Contaminated tubes were discarded when first seen. Animal virulence tests were performed with atypical cultures as well as with random cultures bearing typical colonies of tubercle bacilli.

RESULTS

The results of smears and cultures are shown in the table.

Colonies of bacteria morphologically similar to human-type tubercle bacilli were recovered from 131 or 43.7 per cent of the 300 specimens, or 44.9 per cent of the specimens successfully cultured.

Three specimens were not cultured because of breakage during centrifugation. The cultures of two specimens were overgrown by contaminating nonacid-fast organisms, and colonies of chromogenic acid-fast saprophytes covered the cultures of three more specimens. Control cultures performed with multiple samples of water collected from the dental unit syringe attachments at various times during the course of this study did not produce colonies of tubercle bacilli.

Fifty-five cultures were successfully tested for virulence in guinea pigs. Progressive tuberculosis involving the lymph nodes and viscera resulted in 43 or 78.2 per cent of these animals. Cultures of acid-fast bacilli typical of human-type tubercle bacilli were recovered from the tissues of all these guinea pigs. No evidence of progressive tuberculosis was found in 12 or 21.8 per cent of the animals.

SUMMARY

As a test of whether or not the hands and instruments of dentists are exposed to contamination with tubercle bacilli during the ordinary course of dental procedures performed on individuals who have active pulmonary tuberculosis, smears and cultures were prepared from samples of water washed over the teeth and gingiva of an unselected group of tuberculous patients who were being treated in the dental clinic at the Veterans Hospital in Batavia, N. Y. Precautions were taken to ensure that the sample was essentially water and not sputum collected in the mouth during the treatment. Conventional methods of processing the specimens and performing the bacteriologic tests were used throughout the study. The virulence of atypical cultures and of a representative group of typical cultures was tested in guinea pigs.

Colonies of microorganisms similar to human-type tubercle bacilli were isolated from 131 of the 292 specimens successfully treated by the culture method. These 131 positive cultures came from 66 or 59.5 per cent of the 111 patients examined. A small proportion of the organisms isolated were saprophytic or nonvirulent forms, but the majority apparently were virulent tubercle bacilli. The superiority of the culture method over the smear in the study of mouth washings was attested by the fact that acid-fast bacilli were found in only 26 of the 286 satisfactory Ziehl-Neelsen preparations.

The experience in this study indicates that the hands of dentists and the instruments they use may be contaminated by tubercle bacilli during the examination and treatment of dental patients who have active pulmonary tuberculosis. This is true not only if droplets of sputum expelled from the oropharynx in the act of coughing are deposited on the examiner or his instruments, but also if sufficient contact is made with fluids in the anterior mouth. The dentist, in these circumstances, is working in a milieu containing tubercle bacilli. He should be well aware of this fact and should protect himself and his assistants as much as possible by appropriate hygienic measures. The dental procedures should be conducted with aseptic precautions. Hands, instruments and utensils should be decontaminated adequately after each patient has been treated. It may be possible with the aid of current tuberculostatic agents to temporarily inactivate acid-fast organisms in the oral cavity before or during the course of treatment.

CONCLUSIONS

1. Samples of water used to wash the teeth and gingiva of tuberculous patients during routine dental procedures were tested for the presence of tubercle bacilli by smear and culture methods. Three hundred test samples were obtained from 111 unselected patients during the course of 300 consecutive dental sittings.

2. Acid-fast bacilli were found in 26

or 8.7 per cent of 286 specimens successfully tested by the concentrate Ziehl-Neelsen smear technic.

3. Microorganisms typical of the human-type tubercle bacillus were recovered from 131 or 44.9 per cent of 292 specimens successfully cultured on modified Lowenstein-Jensen solid medium.

4. These findings are in accordance with the well-known fact that tubercle bacilli contaminate the anterior mouth surfaces of persons who have active pulmonary tuberculosis. Dentists and their assistants should be aware constantly of this fact and should protect themselves by appropriate sanitary measures.

A survey of the organization, scope and costs of a representative welfare dental program

Joseph S. Bell, D.D.S., Hartford, Conn.

The State of Connecticut long has had an enviable reputation for its progressive social services and for the high standards of medical care given its indigent. The citizens of the State have been provided with a welfare medical service which is highly regarded by welfare agencies throughout the country. One phase of the service, the Connecticut State Welfare Department's dental care program, in its present form, has been in effect for less than two years; however, a survey covering this short period has furnished considerable information which should be of general interest to all dental practitioners and of special interest to those concerned with public health, welfare or health insurance programs.

ORGANIZATION

The program is governed by regulations and fee schedules which are issued through the Office of the Commissioner of Finance and Control; these regulations are applicable to all State agencies and have the force of law. In addition, there are statutes which cover the general conduct of the Welfare Department. The program is under the direct supervision of the dental consultant who operates from the office of the medical director, State Welfare Department; the financial aspects are the province of the medical payments director of the department. The program allows the State Welfare beneficiaries to use the services of any dentist licensed to practice in Connecticut; regulations and fee schedule are compiled with the cooperation of a dental advisory committee of the Connecticut State Dental Association. Actually, the only restrictions on the type or amount of service rendered are contained

Dental consultant, Connecticut State Welfare Department.

Table 1 • Distribution of expenditures—1952

	Number of dentists	Per cent of dentists in state	Average annual payment to dentist	Per cent of annual dental care program
Participating dentists	799	49	$ 237.38	100
Number receiving up to $1,000–$145,654	774	97	188.18	77
Number receiving $1,000–$44,012	25	3	1,760.48	23
Number receiving $1,000–$2,000. $25,713	19	2+	1,353.32	14
Number receiving $2,000–$3,000. $7,487	3	Less than 1	2,495.67	4
Number receiving $3,000+. $10,812	3	Less than 1	3,604.00	5

in the words "necessary and reasonable" as expressed in the statutes. Within this broad framework, the dental consultant conducts a "personal consulting practice"; each case receives his personal attention and is judged from the point of view of the patient, the practitioner, and the State. All dental work, with the exception of that performed in emergencies, must have his prior authorization. In all cases, however, necessary prophylaxis and roentgenograms are automatically authorized so that a definitive diagnosis and a reasonable estimate may be submitted. Efforts are made to reduce paper work to a minimum, consistent with necessary fiscal control; the dental consultant is available to any practitioner in the State for consultation, visits or talks. This personal contact often expedites the authorization and completion of difficult cases.

DENTIST PARTICIPATION

The scope of the program is broad. Approximately 50 per cent of the licensed dentists of Connecticut participate in furnishing dental care, and the total amount spent in the calendar year of 1952 was $189,665. The distribution of these funds is shown in Table 1.

It is evident from these figures (Table 1) that there was a broad distribution of funds among the participating dentists, with 97 per cent of these receiving 77 per cent of the total funds. The 3 per cent who received over $1,000 each devoted about nine times as much of their time to welfare cases as did the remaining participants. The reason for this seeming inequality is simple: the 3 per cent mentioned are all located in regions which have very high concentrations of welfare recipients.

PARTICIPATION OF BENEFICIARIES

The figures represent a total of 33,000 beneficiaries. This number, of course, did not all receive dental care, and later figures show that approximately one fifth of these people were treated. Prior to July 1952, however, exact figures are not available, so percentages and definite ratios cannot be shown. The only definite comparison that can be made is between the total dental expenditures for 1951 and 1952. There was a decrease of approximately $200,000 from 1951. Two factors may account for the extreme reduction of costs: one is probably the reduced requirements of patients when regular dental treatment becomes a habit. The average person who does not see a dentist in over three years requires

Table 2 • Total number of beneficiaries of the Welfare Department and total dental costs, by agency

Agency	Beneficiaries	Dental cost	Per capita dental costs
OAA-AB*	16,498	$ 52,876	$3.20
ADC†	14,492	126,175	8.71
CW‡	1,820	11,954	6.57
	32,810	$191,005	$5.82

*OAA-AB—Old Age Assistance—Aid to the Blind.
†ADC—Aid to Dependent Children.
‡CW—Child Welfare.

more fillings, extractions, and prosthetic treatment than the person who sees a dentist regularly, within 6 to 11 months after his previous visit.[1] The other factor seems to be the professional surveillance of the program by a dental consultant.

SURVEY OF COSTS AND SERVICES

The following section deals with the cost of the dental care program for individual cases, for the various divisions, and by the various types of dental service rendered. All figures are based on records of the past fiscal year, from July 1, 1952, to June 30, 1953.

The figures in Table 2, although useful for annual comparisons and comparative studies with other programs, do not present a true picture of costs, since the percentage of beneficiaries actually receiving dental care is much less than the total number of beneficiaries.

Table 3 • Number of beneficiaries and percentage of beneficiaries actually receiving dental care, by agency

Agency	Cases	Per cent of total of welfare beneficiaries
OAA-AB*	1,302	7.9
ADC†	5,403	34.8
CW‡	531	29.2
	6,876	29.96

*OAA-AB—Old Age Assistance—Aid to the Blind.
†ADC—Aid to Dependent Children.
‡CW—Child Welfare.

Table 3 demonstrates the small percentage of welfare recipients actually requesting dental care. Since these people are not concerned with the cost of treatment, (all such costs being assumed by the State), other factors must prevent them from seeking care. This group, of course, is not representative of the entire population, but it seems safe to assume that their dental needs are equal to, if not greater than, those of the majority of citizens. What prevents them from seeking care is not known—it may be fear of pain, ignorance of their dental needs, ordinary neglect, or, more likely, a combination of all of these factors. The only factor which definitely is not involved is the cost of treatment.

The figures contained in Table 4 are the actual costs of the program, divided into its three main divisions. A comparison of Table 2 with Table 4 shows the wide discrepancy between per capita costs and actual costs per case. It also becomes evident that the ratio of expenditures to cases is much higher for the older age group than the other groups.

SURVEY OF TYPES OF SERVICE

By approaching the study from another direction, the actual costs of the various types of service can be determined (Tables 5 and 6). The types of service were divided as follows: routine procedures, including restorations, sodium fluoride treatments, extractions which are not of an emergency nature, and so on; prosthetics, including fixed and removable bridges, full dentures, jackets and crowns, repairs, rebases, and so on; and emergencies, which include the majority of

1. Bureau of Economic Research and Statistics. Survey of needs for dental care. III. Dental needs according to length of time since last visit to dentist. J.A.D.A. 46:562 May 1953.

extractions and surgical procedures that do not have prior authorization, and which, according to regulations, do not require it.

Here again it can be noted that the ratio of expenditures to cases is much higher in the group requiring prosthetic care, which naturally represents the older age group. In general, however, New England has a high prevalence of need for prosthetic treatment and replacements; the New England region is the second highest with regard to the percentage of people with permanent teeth missing, and highest as to the average number of teeth involved. Also, the region has the third highest rate for percentage of people having had teeth replaced and the number of teeth being replaced.[2] The figures in Tables 4 and 6 also show that prevention is much less costly than restoration.

Table 4 • Percentage of dental cases, expenditures and cost by case, by agency

Agency	Percentage of dental cases	Percentage of expenditures	Cost per case
OAA-AB*	18.9	27.6	$40.61
ADC†	73.4	66.1	25.02
CW‡	7.7	6.3	22.51

Average cost per case, all dental cases: $27.78

*OAA-AB—Old Age Assistance—Aid to the Blind.
†ADC—Aid to Dependent Children.
‡CW—Child Welfare.

DISCUSSION

Since the present program has been in effect less than two years, there can be no definite conclusions based on comparative studies; however, certain factors are suggested:

1. Since only one fifth of the total number of beneficiaries have received dental treatment during the 1952-1953 fiscal year, the possibility of an increase in the dental case load is present. The New England region is above the national average in teeth needing fillings, and is one of the regions of the country which is highest with respect to dental decay.[2] Since this is so, a re-evaluation of the factors that prevent the large majority of this group from seeking treatment should be undertaken. Although the subjects of this study do not constitute a representative group, information may be obtained that might indicate omissions and failures in the education of the general public in the fundamental principles of dental health.

2. There seems to be no indication of seasonal trends in seeking dental care. The only point that does seem indicative is an increase in dental requests from children of school age in the early Fall; the probability is that the schools play an important role in bringing dental health to the attention of children and parents.

3. The greater need of the older age groups for prosthetic dentistry is natural, but this fact imposes a large financial responsibility for the care of this group on health and welfare agencies. Surveys show that the need for fillings is highest in persons between the ages of 15 to 19 years, and is lowest in patients over 60 years of age. The need for prosthetic replacements is the reverse, however. The need for partial dentures is greatest in patients of 70 or more years; the greatest need for full dentures occurs in persons

2. Bureau of Economic Research and Statistics. Survey of needs for dental care. IV. Dental needs according to region of the country. J.A.D.A. 47:206 Aug. 1953.

Table 5 • Cases and costs by type of dental service

Services	No. of cases	Cost
Routine procedures	4,993	$119,611
Prosthetic	1,033	65,873
Emergency	850	5,521

Table 6 • Per cent of costs and cases; cost per case, by type of dental service

Services	Per cent of cases	Per cent of cost	Cost per case
Routine procedures	72.6	62.6	$23.96
Prosthetic	15.0	34.5	63.77
Emergency	12.4	2.9	6.50

between the ages of 65 and 69. As a corollary, the number of permanent teeth missing and the number of these replaced rises sharply after 20 years of age and this rise continues until well beyond 65 years of age.[3] The number of older people in the population continues to increase with every advance made by the medical profession, and the members of this group will require greater attention as time passes, from both public and private agencies.

SUMMARY

A need exists for the compilation of statistical data on welfare dental programs. In this study, an attempt has been made to present various facets of one such program.

The study covers the costs of the program and the extent of dentist participation.

It also includes the cost of treatment, by recipient groups and by type of service rendered. As expected, the increasing costs of dental service for the older age group is demonstrated; this increase is due primarily to the greater need for prosthetic appliances on the part of this group.

A realistic dental program requires the supervision by a member of the dental profession in order to guarantee high standards of treatment while at the same time maintaining an acceptable level of expenditures. A major factor, not discussed, but of great importance to the successful administration of such a program, is the full cooperation of all local and State dental societies.

3. Bureau of Economic Research and Statistics. Survey of needs for dental care. II. Dental needs according to age and sex of patient. J.A.D.A. 46:200 Feb. 1953.

Acquisition of Knowledge • Knowledge is acquired by a compelling force from within, by desire, or from without, by compulsion. *C. H. Mayo, "The Trained Nurse," Collected Papers of the Mayo Clinic & Mayo Foundation 13:1242, 1921.*

Loss of teeth as a danger in the development of occlusion

Robert R. McGonagle, D.D.S., Euclid, Ohio

The dentist must look beyond the teeth and the supporting structures in order to give his patient the best possible advice concerning the maintenance of his natural denture. All phases of dentistry demand an understanding of the development of occlusion, both the ideal and the abnormal. It is also important that the roles played by the facial musculature and by the bony frame be understood in relation to the human denture. The practitioner must appreciate the role that heredity, health and growth play in the unfolding of the human face.

Observation of the development of the face results in an appreciation of the part played by the natural denture in growth. Some men feel that in instances of anodontia the normal development of the facial bones proceeds largely unaffected,[1] but other investigators believe that the absence of teeth results in a lack of optimal development of the facial parts.[2,3]

The relative stability of the over-all facial pattern is striking. Brodie's work on the growth pattern of the face from three months to eight years bears this out.[4] Changes within the pattern can be observed, however, that challenge the idea of the unalterability of the proportions.

Examination of the denuded skeleton of an animal that has been fed a dye which has an affinity for growing bone enables us to determine the actual growth sites of the face, shown in Figure 1. Some growth sites, of course, are more active at certain times, and some may remain active longer. Much of this activity has been demonstrated experimentally,[5] and it is beyond the scope of this paper to go into a detailed discussion of the subject. It is significant, however, that deposition, absorption and remodeling of bone is going on continuously in the growing face. Even in the adult, all bone is in a constant state of change.

DEVELOPMENT OF THE DENTITION

The dentist's conception of occlusion is distorted or incomplete if he thinks only in terms of the adult dentition. An understanding of the development of the deciduous, mixed and permanent dentitions is necessary. A step-by-step descrip-

Presented before the Section on Orthodontics and Oral Development, ninety-fourth annual session, American Dental Association, Cleveland, September 28, 1953.

1. Sarnat, B. G. Developmental anomalies in dental practice: initiation and proliferation. In Current advances in dentistry 1952-1953, Schour, Isaac, and Levy, Saul, editors. Urbana, University of Illinois Press, 1952, p. 96, 97.

2. Broadbent, B. H. Influence of the third molars on the alignment of the teeth. Am. J. Orthodont. & Oral Surg. 29:312 June 1943.

3. Hellman, Milo. Our third molar teeth, their eruption, presence and absence. D. Cosmos 78:750 July 1936.

4. Brodie, Allan G. On growth pattern of human head from third month to eighth year of life. Am. J. Anat. 68:209 March 1941.

5. Massler, Maury, and Schour, Isaac. Postnatal growth pattern of the facial skeleton as measured by vital injections of alizarine red s. (Abst.) J. D. Res. 23:217 June 1944.

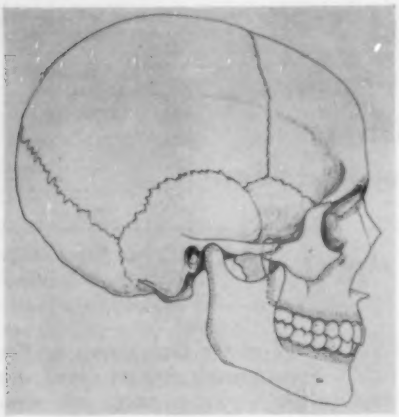

Fig. 1 • Most active growth sites in maturing face

tion of the development of occlusion has been adequately presented in the literature,[6,7] but some of the high lights are worthy of review.

In a one month old child, all the crowns of the deciduous teeth have begun to form, and the jaws are able to accommodate them in uncrowded alignment. The crypt of the first permanent molar in the mandible is located at the junction of the body and ramus, well above the level of the crown of the second deciduous molar. In the maxilla the first permanent molar is located well above the palatal floor and also above the crown of the second deciduous molar.

The deciduous lower central incisors erupt when the child is approximately six months old. The pattern seems to follow from front to back with lower teeth preceding the upper; however, great variation in pattern sometimes occurs. When the child is 24 months old, the deciduous dentition usually is complete.

When the permanent dentition is considered, the story becomes much more complicated. If the skull of a six year old were examined with the cortical bone removed from the buccal plate, the jaws would appear to be full of teeth. The size and shape of the crowns of the teeth, of course, do not increase, whereas the jaws continue to grow.

The permanent incisors require more space to erupt than their predecessors. Broadbent[8] has described this transient malocclusion which often occurs in the upper anterior region as the "ugly duckling stage." During this period, which may extend from the sixth to the eleventh year, the parent, general practitioner and orthodontist should not try to correct this condition. If the child has good development and health, he probably will be treated by natural forces without any mechanical intervention. The permanent cuspids and bicuspids together usually occupy less space than the deciduous cuspids and molars; thus some space is gained in this region of the arch that may be to the patient's advantage.[9]

When the child is three years old, the crypt of the forming lower second permanent molar occupies a position analogous to that occupied by the first permanent molar when the child was approximately one month old. The first permanent molar is now located in the body of the mandible and below the second deciduous molar. By the fifth year the first permanent molar is erupting and soon takes its place at the distal end of the deciduous arch. The second permanent molar follows a similar path to that of the first permanent molar. When the child is approximately nine years old, the third permanent molars, if present, begin their formation. Growth is taking place in the mandible to provide space

6. Broadbent, B. H. Ontogenetic development of occlusion. In Development of occlusion, Gregory, W. K.; Broadbent, B. H., and Hellman, Milo, Philadelphia, University of Pennsylvania Press, p. 31-48.

7. Massler, M.; Schour, I., and Poncher, H. G. Developmental pattern of child as reflected in calcification pattern of teeth. Am. J. Dis. Child. 62:33 July 1941.

8. Broadbent, B. H. Face of the normal child. Angle Orthodontist 7:183 Oct. 1937.

9. Nance, H. N. Limitations of orthodontic treatment. I. Mixed dentition, diagnosis and treatment. Am. J. Orthodont. & Oral Surg. 33:177 April 1947.

for this molar series. The remodeling of the anterior portion of the ramus and the intense activity at the angle of the junction of the body and ramus of the mandible provide additional space for the next molar to erupt.

In the maxilla the picture is somewhat similar with the newly forming first molar being located high above and distal to the second deciduous molar. As the individual matures, the first molar migrates toward the occlusal plane. By the third year the second molar is occupying a position similar to that of the first molar at one month. At six years the first molar has erupted and has taken its position distal to the second deciduous molar. If the third molars are present, the same sequence is repeated for the third time at approximately nine years. A slight distal tipping usually is seen in the upper molar series as these teeth approach the opposing teeth. However, if adequate space is present, they become upright as occlusion is established. Considerable growth, of course, is taking place in the tuberosity of the maxilla which is increasing the distance between the tooth which erupted last in the upper arch and the pterygomaxillary fissure, and thus space is provided for the next molar to appear.

It is obvious that if growth ceases before sufficient room has been provided for the third molars or if there is an overall lack of development, there is the possibility of an impaction of the third molars. The eruption pattern, however, may be precocious and precede the developmental growth pattern. There is then the possibility of a transitory malocclusion during which time various degrees of crowding in the arch may be evident. The teeth do not get any larger, however, but the bones increase in size.

FORCES ON THE DENTITION

In the normal human dentition there are continuous arches through unbroken contact points as distinguished from the lower forms of animal life where diastemas are the rule rather than the exception. It becomes evident, therefore, that whatever happens to a tooth in one arch could affect the stability of a distant tooth in the same arch or even in the opposing arch. Brodie[10] relates that in the anterior upper region the functioning surfaces of the incisors do not lie at right angles to the long axis of the tooth but are inclined toward the midline. Therefore, it is evident that the masticatory stroke, which comes from lateral to centric position, tends to drive these teeth mesially. Of course, this is true on the opposite side of the mouth as well, so the resultant forces are counteracted at the midline. There is an additional force created by the stroke of the mandible which tends to spread the teeth of the upper arch. Counterbalancing this spreading action is the buccal musculature which surrounds the denture. The size, shape and position of the roots of the teeth operate also to help maintain the upper arch.

In the lower anterior region there is not the considerable inclination of the teeth that there is in the upper, and therefore the tendency for these teeth to be driven mesially is diminished. The masticatory stroke tends to drive the lower teeth closer together, because the upper overlap the lower from anterior to posterior. Consequently, there is an inward pressure on the lower arch created by the forces of occlusion plus the action of the buccal musculature of the lips and cheeks.

It becomes obvious that nature must have provided an adequate defense to maintain the lower arch against these strong forces acting from without. This is done largely through the principle of the continuously contained lower arch which

10. Brodie, Allan G. The significance of tooth form. Angle Orthodontist 4:335 Oct. 1934; 5:41 Jan. 1935.

provides mutual support of the teeth through the contact points.

The occlusal surfaces of the molars also meet at an angle as they function, and the resultant forces are again in a mesial direction. This force is constantly operating in the denture. The occlusal surfaces of the bicuspids lie almost at right angles to the long axis of the tooth. It is through these contact points that forces are transmitted mesially. This has been called "the anterior component of force."[11] Inasmuch as force travels in a straight line, this so-called "anterior component of force" which originates in the molars is transmitted through the bicuspids and leaves the denture in the cuspid area. This same region is the junction of the buccal and labial segments of the arch and also the location of intense muscular activity.

In contrast to the permanent teeth, the deciduous teeth have symmetrical crowns and root forms and stand at right angles to the occlusal plane. The angulation of these teeth remains unchanged during the life of the denture. No individual tendency to drift is evident until the first permanent molars erupt.[12] It is true, however, that with the loss of a second deciduous molar the eruption path of the first permanent molar can be more mesial than normally expected. This may indicate the need for a space maintainer, which would direct the permanent tooth into the desired position.

MUSCLES IN RELATION TO THE DENTITION

The most important muscle intimately concerned with the mouth and the position of the teeth is the buccinator muscle. This muscle attaches posteriorly to the pterygomandibular raphe, which is the place of attachment of the superior constrictor muscle of the pharynx, providing a continuous muscle band from the basilar part of the occipital bone to the midline of the mouth. As the buccinator muscle extends forward, it connects with both the maxillary and mandibular molar regions and goes to the corners of the mouth. From here, some of the muscle fibers in the upper segment go to the lower lip, while other fibers in the lower segment go to the upper lip. The muscle fibers in each lip meet at the midline. This occurrence explains the large part played by the buccinator muscle in the formation and shape of the dental arch. There are several superficial muscles, such as the zygomaticus, which originate laterally and run to the corner of the mouth, thereby breaking up the tension of the buccinator muscle, permitting the cuspids to remain slightly prominent and preventing a flattening of the dental arch.

The other muscle of chief concern is the tongue. It is probably more important in the deciduous and mixed dentitions, because it acts as a mold around which the teeth erupt, while it is counterbalanced externally by the musculature of the cheeks and lips. It is true that abnormal size or action of the tongue can cause malocclusion, such as abnormal spacing of the teeth or open bites, either of which may also be caused by disturbances in growth and development. The tongue is large at birth, probably because of its function, and almost fills the mouth cavity in the infant. As the individual grows, the tongue probably plays a role of decreasing importance in the normal adult dentition as far as its effect on tooth position is concerned. Realignment of lower incisors (Fig. 2) is largely due to the action of the tongue.

CLINICAL APPLICATION

The prominent cuspid frequently is a problem, and the parents may wish the

11. Brodie, Allan G. Biological aspects of orthodontia. In Dental science and dental art, Gordon, S. M., editor. Philadelphia, Lea & Febiger, 1938, p. 176-218.

12. Moore, A. W. The mechanism of adjustment to wear and accident in the dentition and periodontium. Unpublished.

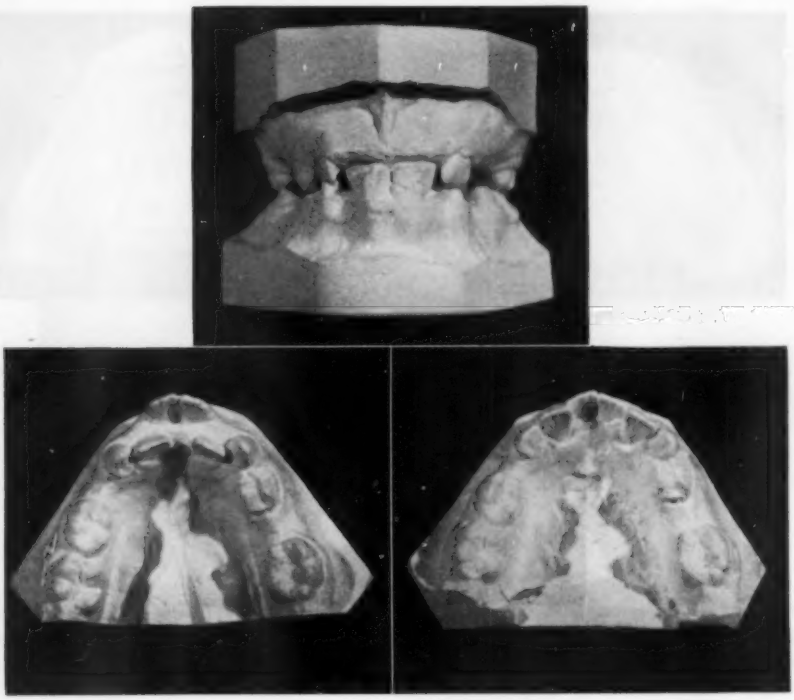

Fig. 2 • Realignment of lower incisors without appliances three months after restraining force of upper incisors was removed

dentist to remove this tooth. The removal of the cuspid, however, would place the full force of the muscles that meet in this region on the weaker teeth both mesially and distally, and a generalized flattening would appear in the region that is normally slightly prominent. The character that the canine eminence adds to the arch would be lost. The general practitioner is well aware that the orthodontist sometimes removes the first bicuspids. However, with the "anterior component of force" operating constantly, if the first bicuspid is removed, one may soon find the second bicuspid in the position of the former with the prominent cuspid still evident. The orthodontist takes precautions to insure that the buccal segments are held back from the so-called mesial drift when the teeth are removed. It is also possible that there may not be a discrepancy between the amount of tooth material and the amount of bone that is present, in which case the teeth should not be removed. If there is adequate bone in the maxilla to support a full complement of teeth, the buccal segments should be moved distally to provide sufficient space for the cuspid to take its important position in the dental arch.

Another problem that frequently confronts the dentist and upsets the parents is the lingual placement of a lower in-

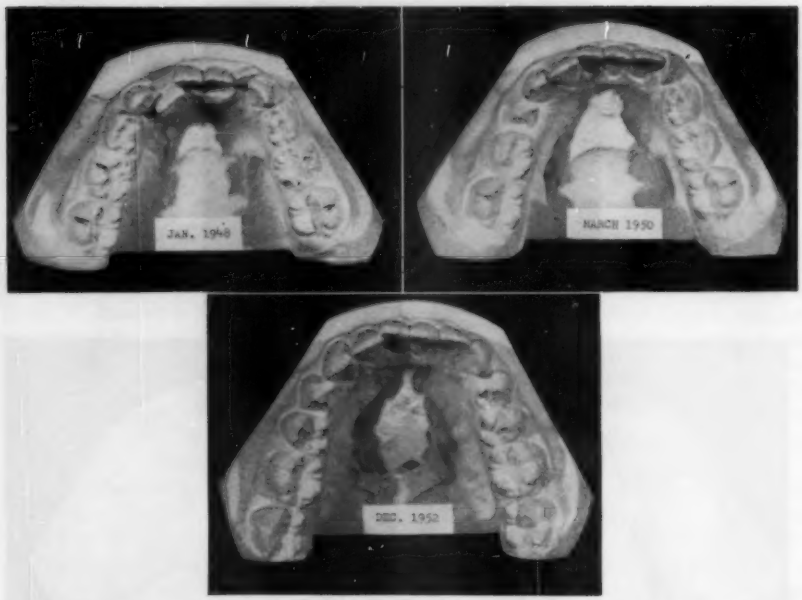

Fig. 3 • Improvement in alignment of lower incisors without appliances

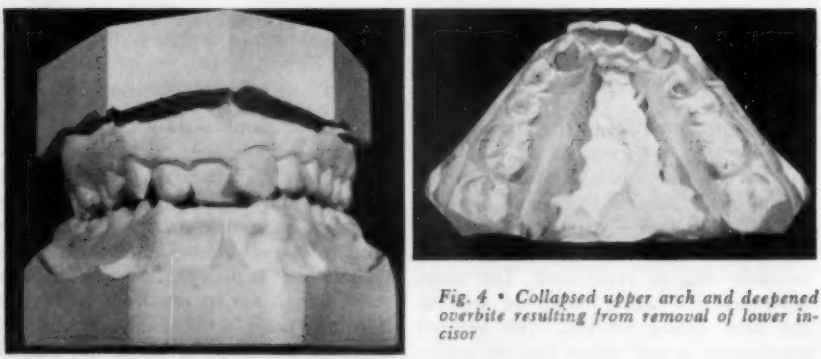

Fig. 4 • Collapsed upper arch and deepened overbite resulting from removal of lower incisor

cisor in a child about eight years old. At this age the problem may be transitory, and nature may correct it (Fig. 3).

If the problem still exists when the child is 14 years old, the temptation may be even greater to remove the partially blocked, lingually placed lower incisor. The removal of the tooth, however, would disrupt the balance of forces, and a collapse greater than the one already present might result. The buccal musculature is constantly active on the exter-

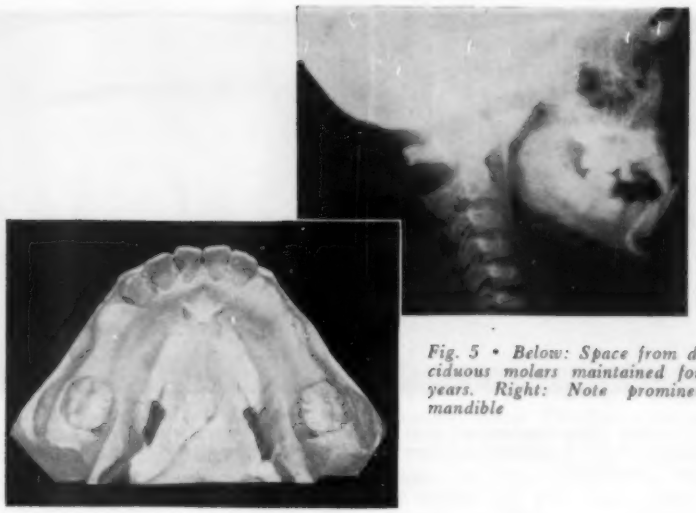

Fig. 5 • Below: Space from deciduous molars maintained four years. Right: Note prominent mandible

nal surface of the arch, and the occlusal forces drive the lower teeth tighter together. The tongue in the nearly mature individual is ineffectual against these two powerful forces; the continuously contained lower arch is the main defense against them. If the incisor were removed, the teeth would seek mutual support again and would tip lingually and drift mesially. This situation could well lead to periodontal problems. As the lower arch retracted to some extent, the lower incisors would tend to become more upright. The upper arch now would be robbed of some of its lingual support, and a deepening of the overbite would result. As the overbite worsened and further support was removed from the upper arch, some irregularity would probably develop (Fig. 4). Extraction of the partially blocked-out lower incisor obviously would not be the answer. Some general practitioners may have removed permanent teeth in a crowded arch with gratifying results, but the removal of permanent teeth without an orthodontist's supervision constitutes, at best, a rather hazardous procedure.

The anterior component of force is largely responsible for the partial closing of the bicuspid space when a deciduous molar is lost. It is usually advisable to place a space maintainer, but facial form is a factor to be considered. There are

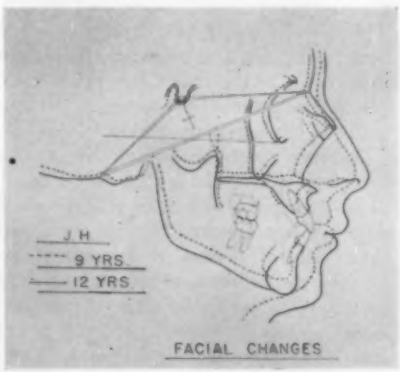

Fig. 6 • Facial outline before and after treatment

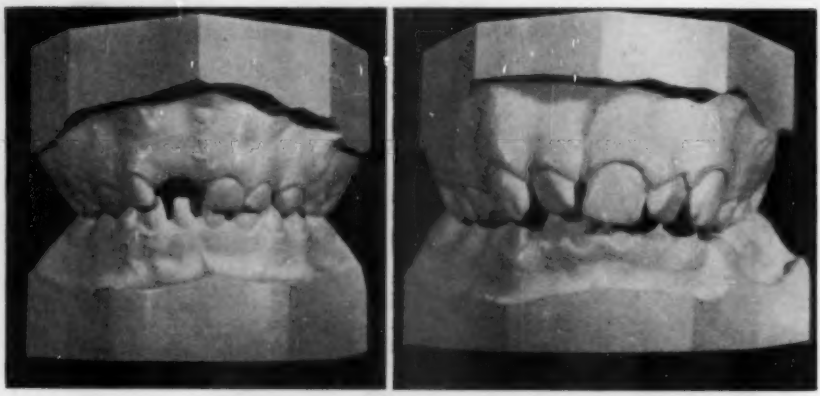

Fig. 7 • Left: Space maintained from deciduous upper central incisor missing two and one half years. Right: Untreated dentition in which space from permanent upper central incisor was not maintained

faces in which the mandible appears more prominent than the maxilla (Fig. 5, right). The loss of deciduous molars in the mandible when such a facial pattern exists does not usually result in a problem of closure of space. Spacing, not crowding, is more apt to be the result (Fig. 5, left).

Improvement in facial outline after the bite was corrected is evident in the superimposed tracing shown in Figure 6. This shows the good development of both maxillary and mandibular regions in contrast to the true Class III pattern which would show little anterior development of the maxillary region.

Another problem which frequently confronts the dentist is that of the treatment to be given to a three year old child who has just knocked out his deciduous upper central incisors. If the esthetic aspect of the problem is paramount or if some muscular habit such as tongue-thrusting has developed, then the use of some restorative technic would be justified. Because the deciduous teeth stand upright with the long axis at right angles to the occlusal plane, there is no anterior or mesial component of force; therefore, an anterior appliance to maintain space is usually unnecessary. The distance between the two adjacent teeth should be measured and recorded. There may be an increase in the measurement taken at six month intervals over a period of years, as shown in Figure 7, left.

In the mixed dentition, of course, there is an entirely different problem. It is not unusual to see a child who has lost a permanent upper central incisor soon after eruption and who has had no treatment to preserve the space (Fig. 7, right). It would be disastrous to ignore this situation. Soon half the space would be lost by mesial movement of the adjacent teeth, and it would be impossible to place a harmonious restoration. The patient would have a problem that would require extensive orthodontic treatment which might have been prevented.

These examples show how closely biologic principles and clinical problems are related. The natural denture is subject to all the influences of growth and development of the human face.

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Cases and Comments

A PARTIAL DENTURE FOR A FOUR YEAR OLD CHILD

By J. J. Goldman, D.D.S., Newton, N. J.

On September 15, 1952, a four year old boy was examined. Extensive decay was revealed. The upper teeth were badly involved. The crowns of the deciduous central incisors, lateral incisors and first molars were devoid of any enamel. The second molars had large occlusal cavities. In the upper arch, only the cuspids were free of decay. The lower molars were all involved with occlusal decay; the lower anterior teeth were normal.

The patient was examined by a physician and was found to be in good health in all respects, except for the oral condition. It was decided to remove the lower right first molar, the upper right and left first molars and the upper lateral and central incisors. The extractions were done under vinyl ether (Vinethene) on September 25, 1952, and healing was uneventful. The remaining teeth were restored to function with zinc oxide and eugenol bases and amalgam restorations (illustration, left).

A problem of esthetics and function was encountered. The mother stated that the boy could not masticate his food properly and that he was lisping very badly. An upper partial denture was constructed to correct the difficulties.

A compound impression was taken of the upper and lower arches, and an individual upper acrylic tray was made. An alginate wash was used in the upper tray, stone models were made and the bite taken in wax. Half round wire clasps were used on the buccal and labial aspects of the second molars and cuspids. Stock acrylic teeth were ground to fit the central and lateral incisors and the first deciduous molars. The denture was completed in acrylic resin with a full palate.

The partial denture was inserted on December 29, 1952, (illustration, right) and the patient was given instructions as to its use and care. Within one week the child had adapted himself to his artificial teeth and could talk without lisping. Psychologically he was greatly improved, as his playmates no longer teased him about his appearance and speech.

This case demonstrates that children can adapt themselves to prosthetic appliances. The denture resulted in an improvement in speech, esthetics and function.

Four year old child before and after insertion of partial denture

COSTEN'S SYNDROME IN AN EDENTULOUS PATIENT

By Ferdinand G. Neurohr, D.D.S., New York.

A 64 year old white woman was referred to Polyclinic Hospital by her physician for a possible fenestration operation. Examination by the ear, nose and throat clinic revealed no apparent pathologic condition. The patient was then sent to the dental clinic for consultation, and a history was taken.

On the left side of the head there were radiating pains, otalgia, clicking and aching of the temporomandibular joint. The patient also complained of difficulty in hearing.

Between 1928 and 1930 the patient had had all her teeth extracted and dentures made. Shortly thereafter a slight earache developed. By 1933 the earache had become worse and was accompanied by tinnitus and clicking of the temporomandibular joint. The patient was treated for three years for a eustachian tube block; this treatment resulted in the disappearance of tinnitus.

A tonsillectomy had been performed in 1934 which did not relieve the earache. In 1937 the patient had been treated for arthritis of the spine; at the present time she has no discomfort.

New dentures had been made in 1950. It was apparent that determinations of the vertical dimension and centric were faulty. Roentgenograms revealed that the anatomical relations of the temporomandibular joint were within normal limits. The audiogram indicated 60 per cent hearing acuity. It was determined from these clinical observations that the patient was suffering from Costen's syndrome.

Treatment • The patient was instructed not to use her dentures. This gave her some relief. Clear acrylic bite-blocks, with no lateral interference, were made. The vertical dimension was increased so as to provide sufficient freeway space. On October 27, 1953, the bite-blocks were inserted, and the patient was instructed to wear them day and night. Two weeks later she returned to the clinic; for the first time in 18 years she was without an earache. The patient claimed that her hearing was better and that the clicking of the joint, although still present, was less severe. The audiogram, however, did not indicate any appreciable change.

The splints were worn for three months with complete comfort. It was apparent, therefore, that the jaw relationship was correct. The acrylic bite-blocks were used to transfer the necessary registrations to the articulator. Cuspless teeth were used, and the second molars were omitted in order to maintain a flat plane. The occlusal plane was made as parallel as possible to the basal plane of the ridges. The teeth were set slightly lingual to the ridges but sufficient room was allowed for her tongue; thus the dentures were made stable. The completed dentures maintained the same relationships as the acrylic bite-blocks to insure the comfort and relief which the patient had experienced while wearing the bite-blocks.

The dentures were inserted in February 1954. When the patient returned one week later, no adjustments were necessary.

Conclusion • Proper tonicity of the muscles of mastication was developed by: (1) the relief of traumatic conditions; (2) the increase in intermaxillary space, and (3) proper centric occlusion. Other symptoms, such as traumatic arthritis, clicking of the joint, radiating pains and otalgia, which probably were due to a reflex or sympathetic condition, disappeared. The elimination of pain probably was responsible for the improvement of the patient's hearing, although the audiogram did not show an increase in hearing acuity.

Before any radical treatment is undertaken to relieve ear disorders such as tinnitus, deafness and otalgia, it must first be determined whether the disorder is of dental or medical origin. There must be complete cooperation between the dentist and the physician to insure proper diagnosis and treatment.

9 Rockefeller Plaza

THE IDEAL BASEPLATE

By W. M. Ringsdorf, Elba, Ala.

The thin, strong and stable baseplates herein described are most satisfactory as they will not warp and require but a short time to construct.

A thin shellac baseplate blank is heated evenly and adapted carefully to all surfaces, except the labial, of the upper denture model. A handle is formed by extending the labial section of the plate outward and downward (Fig. 1). This trimmed shellac base is used as a tray and later as a baseplate.

The buccal flanges of the tray are trimmed 2 mm. short of the peripheral outline and 1 mm. short of the post-dam area previously pencilled on the model. All undercuts in the model are filled with wax and the model is painted thoroughly with two coats of good alginate separating medium. The desired amount of an accepted self-curing denture base resin liquid and powder is mixed until

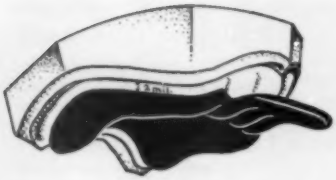


Fig. 1 • Shellac baseplate tray adapted 2 mm. short of outline drawn on model

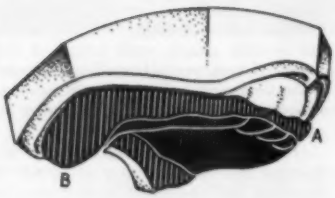


Fig. 2 • Baseplate ready to be finished in wax. A: Thin layer of resin under shellac base. B: Resin reinforcement over buccal flanges and across post-dam border

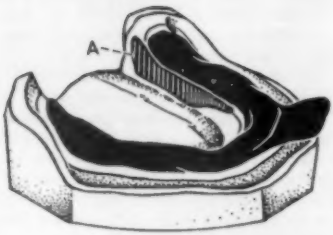


Fig. 3 • A: Waxed-out undercuts in throat area and below internal oblique ridge

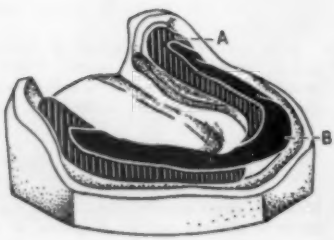


Fig. 4 • A: Resin reinforcement over retromolar pad area, lingual flanges and along buccal flanges to cuspid area. B: Note mistake in that handle has been only partially cut off; therefore, labial section of model is not exposed. Handle should be trimmed back to crest of ridge, exposing resin as shown in Figure 2

slight gelation begins. A liberal amount of the mix is poured into the shellac baseplate tray, which is then pressed firmly on the denture model so as to express the excess mix and compress the shellac base and resin overlay to a minimum thickness. Only a very thin layer of resin on the palatal surface of the tray is necessary.

The remainder of the plastic mix is applied to the buccal flanges of the tray and a small amount is applied across its posterior border. With moistened fingers, the operator adapts the excess mix into the peripheral grooves on the model in order to form a smooth rounded periphery. A wide border is preferable to a thin narrow one as it provides a better soft tissue seal (Fig. 2). This resin-reinforced tray is allowed to "bench cure" until completely hard. The time for complete curing will vary from 30 to 90 minutes, depending on the brand of resin used and the temperature and humidity.

If all the undercuts are filled with wax and the model is well coated with an alginate separating medium, the tray should separate from the model easily. The resultant baseplate should be well fitting and remain so indefinitely. The handle and excess resin should be trimmed off and the buccal aspect of the periphery smoothed with a sandpaper cone. The tray now becomes the baseplate. The labial surface of the anterior section is built of pink baseplate wax and the wax biterim added. This completes the finished upper baseplate.

In constructing the lower shellac baseplate tray, the lingual posterior flange should be cut away so that it does not extend into the undercut throat area or below the internal oblique ridge (Fig. 3). This undercut region on the model should be filled completely with wax as some of the excess resin may be squeezed or patted into it unintentionally, thereby locking the baseplate tray to the model.

The lower tray is strengthened by adding excess resin to its lingual flanges and over the retromolar pad area, also along the buccal flange to the cuspid eminence (Fig. 4). As in the construction of the upper tray, the labial section of the lower tray is completed in pink wax in order to facilitate removal from the model. This thin wax section allows the anterior teeth to be set directly in the ridge if necessary.

These baseplates can be made the right thickness. They are surprisingly strong and will not warp. They are simple to construct, require little working time and can be made by an assistant. If the centric and vertical relation has been obtained properly, these baseplates can be depended on to keep this relation. They have proved to be excellent bases for the denture set-up and try-in.

ACUTE MYELOGENOUS LEUKEMIA

By Harry Roth, D.D.S., New York.

Acute leukemias may first be revealed by painful and ulcerated gingival enlargement with oozing of blood. Oral symptoms are usually accompanied by considerable weakness and prostration due to hemorrhages in various parts of the body. Lymphadenopathy, splenic and liver enlargement and changes in the blood count are typical symptoms.

On May 1, 1952, a patient was referred for diagnosis and treatment of painful, bleeding and enlarged gingivae. The patient had a recent history of slight fever, chill and sweats, tired frequently during the day and required complete rest. A slight sore throat and cervical swollen glands were found. A full-mouth series of roentgenograms and impressions for casts were taken. The mouth symptoms were noted, and the patient was referred for medical consultation.

The interproximal gingiva was enlarged and painful to touch; oozing of blood from the margins and a purplish discoloration were noted (Fig. 1, left). Malocclusion was present and possibly was exaggerated by the loss and nonreplacement of the mandibular right and left first molars (Fig. 1, right). Roentgenograms revealed moderate to advanced loss of alveolar bone, a condition especially noticeable in the posterior regions (Fig. 2). The amount of mobility and the existence of deep pockets were not determined.

The physician prescribed chlortetracycline for what was then thought to be infectious mononucleosis. Because retrogression continued, the patient was referred to the New York Hospital on May 14, 1952, where, in addition to those symptoms previously noted, enlargement of the tonsils was observed. Purpuric and petechial spots appeared on the tonsils and the posterior pharyngeal wall.

Blood examination revealed the following values: hemoglobin—8.7 Gm. per 100 ml.; red blood count—3.3 million per cu. mm.; number of platelets—low; white blood count—24,000 per cu. mm.; "blasts" (immature cells)—100 per cent; nucleated red blood cells—several.

At this time the diagnosis of acute myelogenous leukemia was made. Whole blood transfusion and cortisone therapy were of no avail. The patient died on May 22, 1952.

SUMMARY

Medical investigative support is needed in order to make a correct diagnosis of an acute oral condition which is accompanied by weakness, lassitude and adenopathy. In addition, a

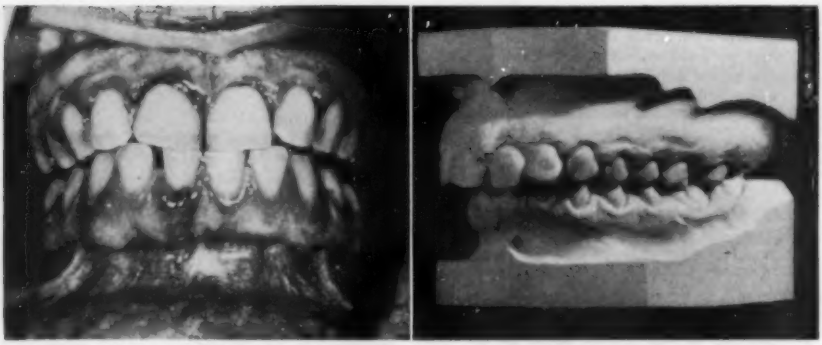


Fig. 1 • Left: Enlargement and hemorrhagic state of interproximate papillae. Right: Study casts indicating deep overbite as well as enlarged interproximate papillae especially noticeable in the maxillary bicuspid and molar regions

Fig. 2 • Roentgenograms, showing severe bone loss

complicating systemic factor should be suspected when an acute oral condition does not respond to local therapeutic measures within four to seven days.

Assistant professor of periodontics, New York University College of Dentistry.

INCIDENCE OF BIFURCATED ROOT CANALS IN MANDIBULAR BICUSPIDS

Everett R. Amos, D.D.S., Indianapolis

In studying routine full-mouth roentgenograms, it is striking to note the frequency of obliteration of the apical third of the root canal of the first mandibular bicuspid and to note, by examining a film taken from a slightly different angle, that the obliteration is caused by bifurcation of the root canal.

One author on dental anatomy, Churchill,[1] states that this form of root canal occurs in 2.3 per cent of the population. This figure apparently was based on a 1925 study by Hess,[2] who examined 75 dissociated teeth and made casts of the canals. Later authors of dental anatomy, such as Zeisz and Nuckolls,[3] state that the canals occasionally divide into buccal and lingual branches in the apical third and often unite again to end in a single foramen. Churchill[1] and Hess[2] state that bifurcation of the second mandibular bicuspid occurs in the population with a frequency of 7.5 per cent.

As the frequency of bifurcation of the canals seemed to be much higher than the figures quoted, 1,000 consecutive sets of routine full-mouth roentgenograms were examined. Bifurcation of the canals of the first bicuspid occurred in 179 persons (17.9 per cent of the sample).

It occurred in the teeth of 16 per cent of the white patients and in the teeth of 21.6 per cent of the colored patients. Bilateral bifurcation was found in the teeth of 114 patients. Unilateral bifurcation occurred in the left bicuspid more frequently than in the right, especially among the whites. Only 2.5 per cent of the patients were found with bifurcation of the second bicuspid, and of these all but six were accompanied by bifurcation of the first bicuspid.

Figure 1, left and center, shows bifurcation of the first bicuspid seen from two different angles. Figure 1, right, illustrates bifurcation of both first and second bicuspids. Figure 2 shows bifurcation in the developmental stage; this case was interesting because the patient was one of a pair of identical twins, both of whom had the same condition.

Bifurcation of the canals of these teeth would be of interest to endodontists, since root canal therapy could not be performed on them. Because of overlapping in the routine roentgenograms, no attempt was made to determine how many of these teeth presented bifurcation of the root, but in a few cases it could be seen clearly. Figure 1, right, shows that perhaps there is bone through the bifurcation of the second bicuspid. The apical bulge on the first bicuspids (Fig. 1) might cause trouble to an exodontist. It should be

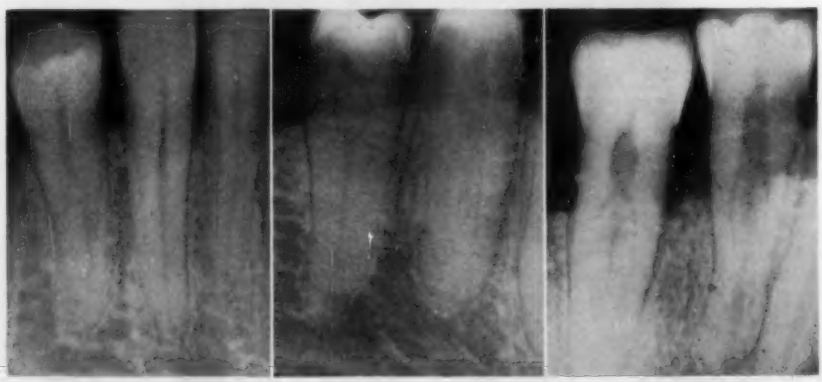


Fig. 1 • Left and center: Bifurcation of canal of mandibular first bicuspid seen from different angles. Right: Bifurcation of canals of first and second bicuspids

Fig. 2 • Development of canal bifurcation in first bicuspid

pointed out that these are exaggerated cases selected to illustrate the condition.

Of 1,000 sets of routine full-mouth roentgenograms examined, bifurcation of the root canals of the lower first bicuspid occurred in the teeth of 179 patients. This phenomenon occurred in 16 per cent of the white patients and in 21.6 per cent of the colored. Bifurcation of the lower second bicuspid occurred in 25 patients, or 2.5 per cent of the sample. All but six of these cases were accompanied by bifurcation of the first bicuspid.

Department of oral diagnosis, Indiana University School of Dentistry.

1. Churchill, H. R. Human odontography and histology. Philadelphia, Lee & Febiger, 1932.

2. Hess, Walter, and Zurcher, Ernst. Anatomy of the root canals of the teeth of the permanent dentition. New York, William Wood & Co., 1925.

3. Zeisz, R. C., and Nuckolls, James. Dental anatomy, the form and function of the permanent teeth. St. Louis, C. V. Mosby Co., 1949.

RESULTS OF TWENTY-EIGHT PULPOTOMIES

By Charles P. Shoemaker, D.D.S., Franklin, N. J.

This report of 28 pulpotomies is made in an effort to stimulate interest both in the thorough checking of pulpotomies and in the making of an accurate evaluation of the operation.

Examination showed that the teeth selected were normal except for extensive caries. There was no history of pain or tenderness.

Each tooth was isolated with a rubber dam, the field sterilized with beechwood creosote, access to the cavity obtained with burs and caries removed by excavators. The field was then resterilized with creosote.

All enamel and dentin over the pulp chamber was removed with burs and the pulp was removed with sterile excavators. The cavity was swabbed with hydrogen peroxide, the hemorrhage controlled by pressure, the stump of pulp tissue in the root canals covered with calcium hydroxide and bone meal (by insufflation) and a layer of asbestos paper placed over the calcium hydroxide. The cavity was sealed with phosphate of zinc cement.

All instruments and materials, such as burs, excavators, rubber dams, calcium hydroxide, College pliers, cotton pledgets and asbestos, were autoclaved.

The operation was judged successful if roentgenographic and physical examination showed that the tooth continued to be normal and if the tooth was neither painful nor tender. Otherwise the operation was judged unsuccessful.

Of the 28 teeth, 19 were deciduous molars and 9 were permanent molars and incisors. Six of the 19 pulpotomies of the deciduous teeth were successful after 9, 12, 18, 24 and 25 months, an average of 18 months each. Thirteen were unsuccessful. Five of the 9 pulpotomies of the permanent teeth were judged successful after a period of from 11 to 22 months, an average of 15 months. Four were judged unsuccessful.

Remarks • Pulpotomies were successful in 39 per cent of these 28 teeth, in about 32 per cent of the deciduous teeth and in about 55 per cent of the permanent teeth. It is obvious that the number of pulpotomies reported on is small.

One would expect that routine roentgenographic examination in pulpotomies which had been judged successful and which had shown no symptoms would reveal infection. Possibly examination should be continued long after two years—the longest period of examination for the pulpotomies reported.

An operation that is successful in 39 per cent of cases treated is undoubtedly better than an extraction. It appears, however, that the profession has been and is advocating pulpotomy with more optimism and less proof than is justified.

SITTING POSTURE FOR THE OPERATOR

By Rudolph O. Gothenquist, D.D.S., Seattle.

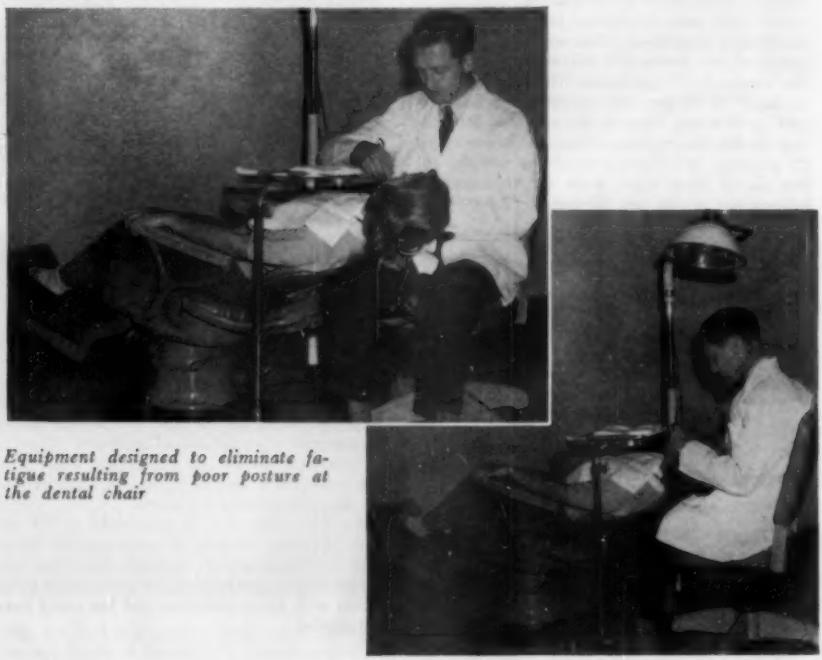
Attempts are being made to reduce the fatigue which results from the operator's poor posture at the dental chair. Various kinds of stools have been used for this purpose. There are, however, disadvantages in the use of the stool. First, the operator's legs often support two thirds of his weight. Second, the operator cannot sit close enough to the field of operation without leaning forward and to one side in a twisted position. When this position is held for long periods of time, a strain is placed on the muscles and nerves of the back. Third, most stools have no support for the back.

The equipment described is designed to eliminate these problems. First, the operator's chair is adjusted for maximum comfort. The height of the seat is set so that the thighs are supported evenly and the feet are flat on the floor. The back of the chair supports the operator's back from the hips to the shoulders. A fixed chair back was found to be more satisfactory than an adjustable one, as the fixed chair back gives support in the shoulder region and eliminates the excessive curvature that an adjustable, movable one allows. The tip-back spring is tightened to give firm support for the upper part of the operator's back. The chair has a swivel and casters for mobility.

The dental chair is set with the slide for the headrest high and the backrest low. The metal arm supporting the headrest is adjusted to form a right angle in order to provide maximum room for the operator's leg. The chair is tipped back and the back lowered. Then the patient raises her head while the headrest arm of the chair goes under and around the operator's leg just above the bend of the knee. Equipment used this way allows the operator to face the field of operation and to sit close to it (illustration, above).

When the dentist works in back of the dental chair, the headrest slide is lowered as far as possible, and the arm of the headrest is adjusted to an obtuse angle with its apex toward the patient. This position also permits the operator to sit close to the work (illustration, right).

A single upright support allows the table



Equipment designed to eliminate fatigue resulting from poor posture at the dental chair

to swing away or toward the patient. One quarter of the tray is built up with folded towels to serve as an arm rest for the operator.

A movable surgical lamp stand with a dental light is used so that light may shine directly into the patient's mouth when his face is turned toward the operator.

The method described will not be satisfactory for all operators nor for every adult patient. However, those operators who can use it will cut the fatigue which results from poor posture at the dental chair.

FOURTH MOLARS

By R. L. Schulze, D.D.S., Omaha.

As a result of evolutionary changes, fourth molars have become somewhat of a rarity. When they do occur, they are usually so rudimentary in form as to warrant the designation of supernumerary. In the case described, however, the patient had fully developed impacted fourth molars and surgery was required.

The patient was a well-developed 28 year old colored man. He first noticed a swelling in the lower left molar region in September 1952. Since then swelling had recurred about every three months. Twice his dentist gave him penicillin. He was first seen in this clinic August 12, 1953, at which time he complained of trismus and moderate swelling in the lower left molar region.

Visual examination revealed no cause for the cellulitis. There were no fillings or cavities, and the gingival tissue was healthy. The third molar was fully erupted; however, lateral roentgenograms of the mandible revealed a vertically impacted fourth molar on the left side and a mesioangular impaction on the right (illustration). Both fourth molars appeared to be fully developed.

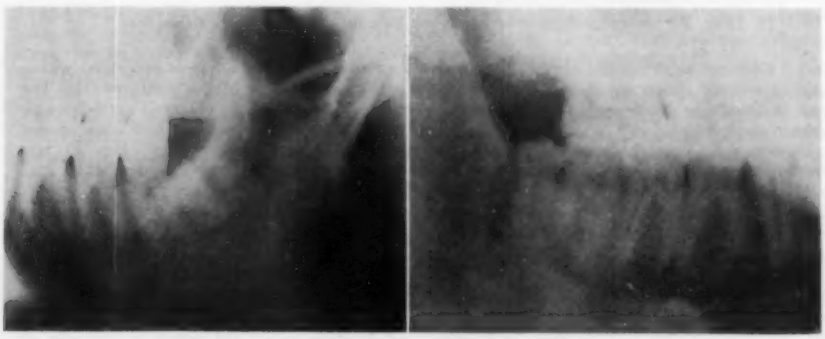
The patient was admitted to the hospital and given 600,000 units of penicillin intramuscularly daily. On admission the patient had a temperature of 99° F. All laboratory reports were normal. On the following day there was drainage buccally to the lower left second molar in the gingival crevice. The drainage, swelling and trismus diminished daily, and on August 18, 1953, the impacted fourth molar was removed under local anesthesia. Two large buccal roots were fused with moderate hypercementosis of the apical third root. There was also a slender lingual root. Postoperative recovery was uneventful.

Dental department, U. S. Veterans Hospital.

TECHNIC FOR MAKING ROENTGENOGRAMS OF THE CONDYLE

By Fernando Palomo G., D.D.S., Guatemala.

For a study of the condyle, it is possible to make a roentgenogram which is clear and does not have superimposed shadow. The x-ray machine is focused close to the condyle which is opposite to the one of which the roentgenogram is to be made (Fig. 1, left). This procedure enlarges the shadow or image of the overlying condyle and blurs it in such a way



Impacted mandibular fourth molars

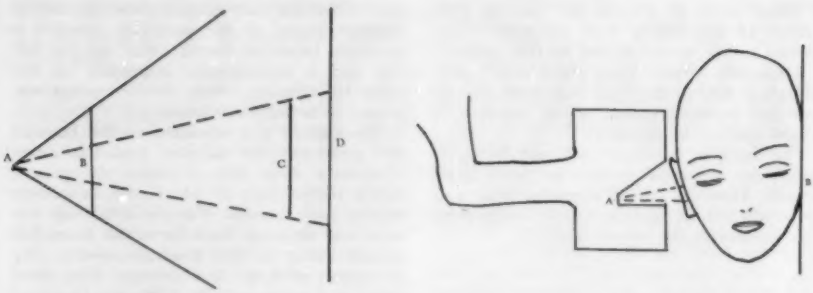


Fig. 1 • Left: X-ray machine focused close to overlying condyle to obtain roentgenogram of far condyle. A, focus; B, overlying condyle; C, condyle of which roentgenogram is to be made; D, film. Right: Roentgenogram of left condyle is made with head of x-ray unit in contact with right side of patient's head. A, focus; B, film

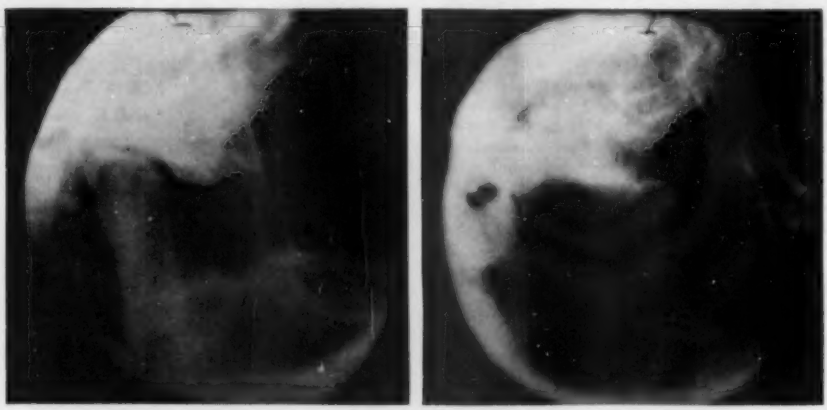


Fig. 2 • Roentgenogram of condyle taken by method described in text

that it does not show on the film. It is necessary to remove the cone of the machine so that the machine is focused as near as possible to the patient.

For example, to make a roentgenogram of the left condyle, the head of the x-ray unit is placed in contact, without its cone, against the right side of the patient's head (Fig. 1, right). The central beam is directed to the opposite side, entering 1 cm. under the border line of the mandibular notch. The ramus of the mandible serves as a filter, and a clear image of the left condyle is projected within the blurred shadow of the right condyle. The left condyle will not be enlarged much because the left side of the patient's face rests against the film. The roentgenogram (Fig. 2) was made with the x-ray machine set at 10 ma., 55 kv., with a 1¼ exposure time. A 1 mm. aluminum filter was used together with a double screen.

Professor, Dental School, San Carlos University, Guatemala.

BUREAU OF LIBRARY AND INDEXING SERVICE

The American Dental Association Film Library

The following films have been added to the American Dental Association Film Library and are now available at a nominal rental fee of $2.50 to dental societies, study clubs, dental schools, hospital dental staffs, and armed services dental personnel. Since the number of prints of each title is necessarily limited, it is suggested that program chairmen plan their programs far enough in advance to insure availability.

FILM REVIEWS

Cranioplasty with Methylmethacrylate Resin Plates • 16 mm., color, magnetic sound, 850 ft., 25 min. Produced in 1952 by Eduard G. Friedrich, D.D.S., and Frank P. Nash, M.D. Photography by Morris Blechman. Procurable on loan ($2.50) from the American Dental Association Film Library, 222 E. Superior St., Chicago, and on purchase from the producers at 4763 Milwaukee Ave., Chicago. Produced in cooperation with the staff and chief oral surgeon at the United States Naval Hospital, Great Lakes, Ill.

The film opens by showing two male patients who are in need of cranioplasties to remove scars that had resulted from wounds suffered in World War II. The first patient has a deep opening at the back right quadrant of the head, and the second patient has a huge scar covering the right front lobe. Close-ups show the area to be covered outlined in crayon. The next sequence depicts the various steps involved in the construction of the acrylic plate.

The surgical procedure is shown and the close cooperation between the neurosurgeon and the dentist demonstrated. The patient is given premedication. After the head is scrubbed, an incision is made according to plan. The acrylic plate is placed in the skull by the dentist under the supervision of the neurosurgeon and is wired in place. Postoperative views show the great improvement in the appearance of the patient.

This film is well presented and photographed. Since it is highly specialized it may not interest the general practitioner. It is suitable for use by medical or dental study clubs and for dental society programs since it shows the close relationship between dentistry and the medical profession. Since the film has a magnetic sound track, it must be projected on a magnetic sound projector. If this special projector is not available, however, it can be projected as a silent film on a regular 16 mm. sound projector since the legends are sufficiently explanatory.

Oral Rehabilitation (Gingival Hyperplasia Using Gingivoplasty) • 16 mm., color, magnetic sound, approximately 1,000 ft., 35 min. Sponsored by the Veterans Administration and produced in 1953 by Clifton O. Dummett, D.D.S., chief, dental service, Veterans Administration Hospital, Tuskegee, Ala. Photography by M. V. Stokes II, C. B. Graham, and O. E. Gaillard, Medical Illustration Laboratory, Veterans Administration Hospital, Tuskegee, Ala. Procurable on loan ($2.50) from the American Dental Association Film Library, 222 E. Superior St., Chicago. For purchase write to the Central Film Library, Veterans Administration, Washington 25, D.C.

This film deals with the surgical treatment of gingival hyperplasia in a patient in whom the condition has developed as a result of the administration of diphenylhydantoin sodium for the control of epilepsy.

As the film opens, a 32 year old World War II veteran is being readmitted to the Veterans Administration hospital at Tuskegee for the treatment of chronic epilepsy which had resulted from a war injury.

A detailed medical and dental diagnosis is given verbally. The plan of treatment consists of a lower anterior gingivoplasty and the construction of a temporary acrylic splint.

Intraoral photographs which show the region to be incised are supplemented by demonstrations on plaster models and roentgenograms. A histological study of the tissue is shown and curettage, postoperative treatment, insertion of the acrylic splint and the instruction of the patient in oral hygiene are demonstrated. Postoperative intraoral photographs show complete healing.

This film is well organized and suitable for postgraduate teaching. The use of multiple audio-visual aids increases its instructional value. Since this film has a magnetic sound track it must be projected on a 16 mm. sound projector with a magnetic head. If this type of projector is not available, however, the film may be projected on a regular 16 mm. sound projector as a silent film since the legends make it self-explanatory. Dental societies, study clubs and periodontologists may find it interesting material for use in their programs.

COUNCIL ON DENTAL RESEARCH

Revision of list of certified dental materials

Samples of the certified hydrocolloidal impression materials were recently retested by the American Dental Association Research Fellowship at the National Bureau of Standards under the supervision of that Bureau. These materials were found to comply with American Dental Association Specification No. 11 for Hydrocolloidal Impression Materials. This list supersedes that published in the December 1953 issue of THE JOURNAL.

CERTIFIED HYDROCOLLOIDAL IMPRESSION MATERIALS (A.D.A. SPECIFICATION NO. 11)

Material	*Manufacturer or distributor*
Coe-Loid 66	Coe Laboratories, Inc.
Deelastic	Kerr Manufacturing Co.
Dentocoll	The L. D. Caulk Co.
Elastic Colloid	The S. S. White Dental Mfg. Co.
Kerr Hydro-Colloid	Kerr Mfg. Co.
Perfectocoll	Baker & Co., Inc.
Plasticoll	Lee Smith Co.
Surgident	Surgident, Ltd.

JANUARY 1955

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Editorials

Delegates for the fourth time, vote to exclude dentists in OASI

For the fourth time since 1949 the House of Delegates of the Association has voiced its opposition to the inclusion of dentists in the Old Age and Survivors Insurance program of the Federal Social Security Act. The action was taken by a three to two vote at the ninety-fifth annual session of the Association in Miami, Florida, November last. The vote of 235 to 152, cast on voting machines, was preceded by an extended session of open discussion in which proponents and opponents expounded their views and expressed their opinions. Although the decision of the delegates will meet with the approval of a large segment of the profession it cannot be expected to satisfy all —and that is normal in a democratic organization such as this Association.

When an issue becomes so one-sided that it meets no opposition it ceases to be an issue. OASI has been an issue in this country for a score of years. It will continue to be an issue until it is finally resolved. The fact must be faced that in the OASI issue two conflicting philosophies are involved: the philosophy of individualism and the philosophy of paternalism. There is good and ill in each. Which will finally prevail in these United States, or whether a balance of the two is possible, time alone will tell. At Miami the Association once more elected to cast the lot of dentistry with those who favor the former philosophy—a philosophy on which both the country and the dental profession were founded and a philosophy which has made both strong. Certainly the action of the House of Delegates at the Miami meeting makes it abundantly clear that the legislative body of the Association is determined to maintain for dentistry in this country the same course of individualism as the profession has deemed wisest in the past.

Ultrasonic cutting devices demand ultraconservative consideration

So many inquiries have been received recently by the Association regarding the ultrasonic dental cutting device which has been so vigorously "press-agented" in the daily newspapers and certain popular magazines that the report published in the news section of this issue is of special interest and value.

According to this report and to two others on the same subject presented at the ninety-fifth annual session of the Association in Miami last November, the adaptation to dentistry of the ultrasonic principle bears promise. Many months of research and much mechanical improvement are needed, however, before responsible manufacturers will consider offering the instrument to the profession for general use.

If and when the device is perfected, dentists will be among the first to acclaim its merits and put it to practical use. At the present time, however, dentists are among the first to caution both patient and public to use the utmost restraint in accepting published promises and to withhold judgment on the device until it has been thoroughly perfected and its performance thoroughly proved.

National Children's Dental Health Week: a sturdy vehicle for dental health education

The action of the House of Delegates of the Association at the recent Miami meeting in changing National Children's Dental Health Day to National Children's Dental Health Week is one more indication of the profession's increasing recognition of its responsibility in matters pertaining to child health.

The action, which becomes effective February 7-13 of this year, will be welcomed by most dentists, other health leaders and educators as it provides a greater opportunity to conduct a worthwhile dental educational program—one that will make a solid impact on the community and provide a lasting benefit to children. Instead of being compelled to crowd a multitude of educational projects and promotional devices into a few hours, community leaders can schedule their activities more wisely, space their projects more carefully and expand the more important aspects of the program more effectively.

It is not to be expected that one week's observance each year—no matter how intensive—will bring about the ultimate in dental health for American youth. But it may be expected that such observance in more communities will motivate more parents, and other adults, to recognize the seriousness of dental disease to children and motivate greater demand for more and better methods of preventing such disorders. Already, during its seven short years of existence, the one-day observance has

made a definite impact on America's consciousness. Is it too much to expect that seven days each year devoted to the same cause will increase such effect sevenfold? Or at least to such an extent that dentistry may point to as substantial a reduction in dental disease as has been accomplished in certain other human disorders.

According to a recent report of the Metropolitan Life Insurance Company,[1] the death rate among children 5 to 14 years of age dropped nearly two-thirds between 1933 and 1953—from 158.0 to 57.3 per 100,000 boys of elementary school age insured by that company and from 125.8 to 36.8 per 100,000 girls in the same category. Decreases of 85 per cent or more were recorded in the death rate from a number of diseases, including the principal communicable diseases of childhood, appendicitis, pneumonia and influenza and tuberculosis. These improvements are cited simply to point out that what has been accomplished in other fields of child health care can and must be accomplished in the field of dental health.

To bring about this accomplishment the dental profession must assume and maintain an even stronger leadership in community health activities than it occupies today. National Children's Dental Health Week provides one more opportunity to demonstrate leadership in such matters.

National Children's Dental Health Week is a natural vehicle for carrying the message of preventive dentistry into every home, school and institution in the community. It is a vehicle which may carry information regarding the causes of dental caries, the harmful effects of sweets, the beneficial effects of fluoridation, early and regular dental care, proper home care and diet. In short, enough information can be distributed by means of this vehicle to stimulate better dental health habits throughout the remaining 51 weeks of the year.

The House of Delegates, acting on the recommendations of the national, and several state councils on dental health, is to be commended for its promptness in providing this vehicle. May each dental society load it to capacity, drive it wisely and use it efficiently.

1. Health of school children. Statistical Bulletin, Metropolitan Life Insurance Co. Vol. 35, No. 8, Aug. 1954.

Newly discovered document enlivens early history of dental organizations

The recent discovery[1] of the original manuscript minutes (1840-1856) of the American Society of Dental Surgeons, the first dental society of national pretensions in this country, and in the world, has a twofold significance for dentistry. The possession of this basic document of American organized dentistry is, for the profession, like the possession of the original engrossed copy of the Declaration of Independence or of the Constitution of the United States for the nation as a whole. It is something to be treasured as a professional symbol.

Furthermore, it is a source of valuable information with regard to the experience, not altogether happy, of early dentists in their attempt to advance the profession

through organization. Some of the material in this document was published in the first dental journal, but the inspirations and frustrations of professional pioneers, reflected in contemporary published summaries, appear in fuller and more enlightening detail in the original record.

Not many documentary records of early organized dentistry are known to exist, and it is usually by chance rather than by foresight that these precious documents, if extant, have been preserved. Of the few records of the American Dental Association known to exist, the original manuscript of the second meeting of the Association in 1862, presumably in the hand of Jonathan Taft, its secretary, is in possession of Northwestern University Dental School. This manuscript is perhaps the earliest extant document of the Association's history. In view of the prospective centennial celebration of the American Dental Association in 1959 and the publication of an authoritative history of the Association now in preparation, documents such as these are particularly to be prized.

An effort is being made to locate and collect as many documents as possible relating to the history of the American Dental Association, and some important ones have already been assembled. It is to be hoped that bringing to light so important a document as the complete minutes of the American Society of Dental Surgeons will impel all older dentists, dental librarians, officials and school administrators to rummage in attics and forgotten files for further documents which will throw light on the development of the oldest, largest and most powerful national dental organization in the world—the American Dental Association.

1. News of dentistry. J.A.D.A., January, 1955.

DENTAL HEALTH CONFERENCE

Delegates to the Fifth National Dental Health Conference held November 6 at the Hotel McAllister in Miami, Fla., just prior to the American Dental Association's 95th annual session, were urged to get behind the public health aspect of dental treatment to insure a healthier America. The conference, under the chairmanship of David W. Brock of St. Louis, discussed the methods by which the dental profession could be effective in developing new health programs and in extending those already in operation.

Given as an example of the results which can be achieved through efforts of the dental profession was the dental health division of the Tennessee Department of Public Health. Today, largely as a result of the work of Tennessee dentists, the Division of Dental Health carries on activities in preventive dentistry, research and dental health education. Funds have been earmarked specifically for dentistry. The dental director has the same rank and pay as the medical officer. There is a staff of 16.

Describing the development of the state dental program, Oren A. Oliver, chairman of the Public Health Council of the Tennessee Department of Public Health, and a featured speaker at the Conference, said, "Only because of . . . hard work by professional groups, such as medicine and dentistry, has the Tennessee Department of Public Health become a strong department of public health and not a political football."

A morning panel, moderated by Carl L. Sebelius, Tennessee's dental health director, discussed the methods used by the dental profession to achieve the state dental program. In order to achieve the results described by Dr. Oliver it was first necessary to educate the members of the dental profession themselves, said Doyle J. Smith, chairman of the state society's workshop committee. "The average member of the dental society saw no need for a public dental program," Dr. Smith stated. Workshops sponsored by the state society served to educate both the members and the general public and provided the information necessary to the planning of a sound dental program.

"The dental health problems of any state can be and will be solved," Dr. Smith stressed, "only if each dentist becomes concerned about the need for an improvement in his own community."

The activities of the dental society's legislative committee in having funds earmarked specifically for dentistry were outlined by James J. Vaughn, chairman of the Tennessee State Dental Association's legislative committee. The committee enlisted the aid of all district dental societies in reaching members of the state legislature, Dr. Vaughn said. Dentists appeared before the legislature, sought the support of the governor and worked closely with the public health commissioner.

Cooperative projects of state health departments and state dental societies were discussed during the afternoon session. Among the speakers on the Conference program were Donald J. Galagan, assistant chief of the Division of Dental Public Health, U. S. Public Health Service; Lloyd H. Dodd, member of the Board of Public Health Advisors, State of Illinois Department of Public Health, and Francis J. Garvey, secretary of the American Dental Association Council on Legislation. About 200 persons attended the Conference.

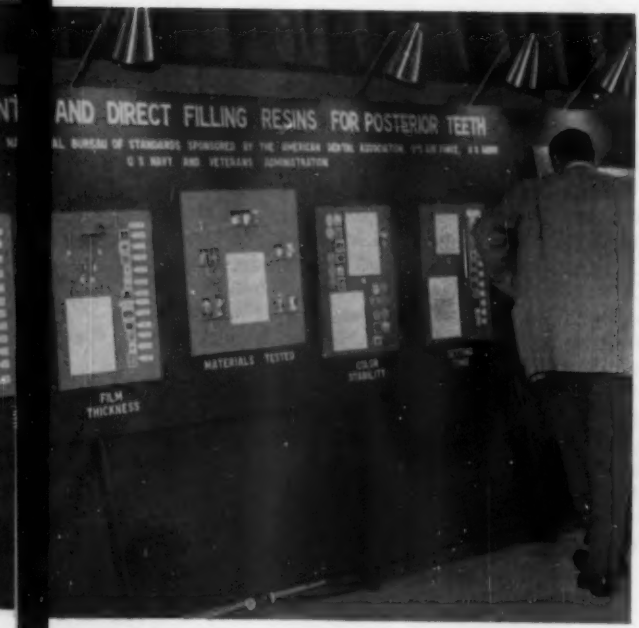
AMERICAN DENTAL ASSOCIATION
95TH ANNUAL SESSION

The Conference of State Society Officers November 7 elected (l. to r.) Robert C. Frates, secretary; Edgar L. Bessette, president, and Fritz Pierson, vice-president.

The scientific program included five panel discussions and a symposium.

Robert Thoburn, president of the Florida State Dental Society, welcomes the delegates to Miami.

Ruth Wade, Audrey Harris and Velma Child, of the Central Office staff, check a stencil for a reference committee report.



A clinician uses a large screen to illustrate his talk in the projected clinic program, part of the scientific session. Left: A prize-winning scientific exhibit.

ASSOCIATED GROUPS

American Dental Society of Anesthesiology at its November 7 meeting honored two dentists who pioneered in the field of anesthesiology. Charles K. Teter of Twinsburg, Ohio, and Jay A. Heidbrink of Orlando, Fla., were given special achievement awards for their work in developing anesthetic equipment and technics still used in hospitals throughout the world. Dr. Heidbrink was a pioneer in the development of anesthesia apparatuses, particularly the safety devices. His designs were used also in making oxygen equipment for pilots in World War I. Dr. Teter designed one of the first scientifically accurate machines for administering nitrous oxide, oxygen, ether or chloroform.

Elected officers of the group were William Kimmey, of Ogden, Utah, president; Harcourt Stebbins of Lake Charles, La., first vice-president; Peter King of Dayton, Ohio, second vice-president and J. H. Mervis of Clairton, Pa., secretary-treasurer.

International College of Dentists at its November 7 meeting elected the following officers for the College at Large: William M. Sexton, Bristol, Va., president; Philip E. Adams, Boston, president-elect; Paul J. Aufderheide, Cleveland, vice-president; H. O. Westerdahl, Minneapolis, secretary-general; R. Gordon Agnew, San Francisco, treasurer; Fred A. Richmond, Kansas City, Kan.; Oren A. Oliver, Nashville, Tenn., and C. Raymond Wells, Brooklyn, executive council.

Elected officers of the United States section were: Joseph B. Kennedy, Des Moines, Iowa, president; C. J. Perschbacher, Appleton, Wis., president-elect; Frank F. Lamons, Atlanta, Ga., vice-president; Roy F. West, Seattle, treasurer; H. O. Westerdahl, Minneapolis; Reuben E. Miller, Easton, Pa.; Willard T. Hunnicut, Atlanta, Ga.; John T. Ryan, Seattle; Gordon L. Teall, Hiawatha, Kan.; Bruce R. Kurtz, Pasadena, Calif., regents.

American Society of Dentistry for Children elected the following officers for the coming year at its meeting November 6 and 7: Willard T. Hunnicut of Atlanta, Ga., president; Henry M. Wilbur of Louisville, Ky., president-elect; Lawrence R. Burdge of Red Bank, N. J., vice-president, and Albert Anderson of San Diego, secretary-treasurer. Elected to the executive council were Hugh A. T. Keenan of Corning, N. Y.; C. Frank Tuma of Cleveland and Laren W. Teutsch of Santa Ana, Calif. The Society selected David B. Law of Seattle as delegate to the American Board of Pedodontics.

Academy of Oral Rehabilitation of Handicapped Persons decided at its November 5 meeting to compile material for a comprehensive brochure on dental care for persons handicapped as a result of cerebral palsy, multiple sclerosis, blindness and other causes. It will be the first time such a packet has been published, the Academy announced. Some of the material to be used will have been published previously; some will be produced by the Academy.

Re-elected as officers were Manuel M. Album of Philadelphia, president; M. Michael Cohen of Boston, president-elect, and Hugh M. Kopel of Detroit, secretary-treasurer. The Academy's next meeting was set for Chicago in 1956.

National Association of Seventh Day Adventists at the close of its three day meeting elected C. C. Ray of Miami, Fla., as president, and Albert Burns of Loma Linda, Calif., vice-president for the coming year. Also elected at the November 5-7 meeting were John Bata of Hyattsville, Md., secretary-treasurer; Robert A. Hassler of Culbertson, Mont., member

of the board of directors, and R. E. Mallernee of Atlanta, Ga., editor. John Buhler, dean of the School of Dentistry at Emory University, and Victor Halperin of the oral medicine and pathology department of Emory University were featured speakers.

American Academy of Oral Roentgenology, which met November 6, elected as officers the following men: Edward C. Stafne of Rochester, Minn., president; William Updegrave of Philadelphia, president-elect; Arthur H. Wuehrmann of Birmingham, Ala., vice-president; Harrison M. Berry of Philadelphia, secretary-treasurer; Donald T. Waggener of Lincoln, Neb., editor, and E. A. Dabrowski of Baltimore, councilor for the eastern section.

Association of American Women Dentists installed Josephine M. Irey of Denver, Colo., as president at its November 8 meeting. Mary C. DeRisi of Washington, D. C., became president-elect, and Lorraine Thompson of Denver, Colo., was selected secretary-treasurer.

American Academy of Gold Foil Operators elected C. M. Stebner of Laramie, Wyo., as president for 1954-55. Dr. Stebner succeeds Bruce B. Smith of Seattle. Also elected to the roster of officers during the November 6 meeting were G. D. Stibbs of Seattle, president-elect, and L. R. Ludwigsen of San Francisco, secretary-treasurer. Executive council members are H. D. Coy of Richmond, Va.; Lester E. Myers of Omaha, Neb., and R. E. Plummer of Seattle.

American Association of Dental Editors urged that a 6 by 9 inch journal page size be adopted by societies starting new dental journals and by societies contemplating a change in the size of their journal page. Standardization of the journals' page size was recommended at the November 6 meeting held in conjunction with the Association's Council on Journalism. The recommendation was made on the grounds that national advertising could be attracted more readily if the advertiser could use the same advertising plate for all journals. The editors also recommended that the term of office for dental editors be lengthened to give the editor more time to become proficient at his job.

William W. MacQueen of Minneapolis was elected president to succeed Walter C. McBride of Detroit. Also elected were Ralph Rosen of St. Louis, president-elect; Austin H. Kutscher of New York, vice-president, and L. Franklin Bumgardner of Charlotte, N. C., secretary-treasurer.

The editors' group discussed preparation of manuscripts for publication, methods of meeting competition from proprietary dental journals and the use of abstracts by the journals. Speakers on the program were Lon W. Morrey, editor of THE JOURNAL OF THE AMERICAN DENTAL ASSOCIATION; Walter Hyde, editor of *North-West Dentistry,* and Austin H. Kutscher, associate editor of the *New York State Dental Journal.* A paper by Kent F. Kohler, editor of the *Dental Alumni Bulletin* of the University of California was read by Dr. Hyde. Some 46 persons attended the meeting.

American Association of Public Health Dentists announced its support of a proposed dental workshop program sponsored by the University of Michigan and urged increased work on the part of public health dentists in the care of the chronically ill. The two actions were taken at the Association's November 7 meeting. The statement adopted by the group on care of the chronically ill stated in part, "The interest of public health workers in the general problems of the chronically ill has not been paralleled by a similar dental interest . . . public health dentists need to begin to explore the extent of dental pathology and the tech-

nical, administrative and physical problems associated with rendering dental services to the chronically ill."

Elected officers for the coming year were Fred W. Wertheimer of Lansing, Mich., president; F. M. Erlenbach of Hartford, Conn., president-elect; Roy D. Smiley of Indianapolis, secretary; Richard C. Leonard of Baltimore, editor, and Fred W. Wertheimer of Lansing, Mich., publisher. Elected to the executive council were F. A. Bull of Madison, Wis., David Striffler of Santa Fe, N. M., Harry Bruce of Atlanta, Ga., and Chester V. Tossy of Lansing, Mich.

American Association of Dental Examiners meeting November 5 and 6 selected Russell I. Todd of Richmond, Ky., as its president for the coming year. Chosen president-elect was Florian J. Martin of Medford, Wis. Secretary is C. A. Bumstead of Lincoln, Neb., and vice-presidents are Walter A. Wilson of Trenton, N. J.; A. W. Kellner of Hollywood, Fla., and R. F. Gilmore of Grand Junction, Colo.

American Academy of Periodontology conferred a fellowship on Raymond E. Johnson of St. Paul for his outstanding contributions to periodontology at the Academy's 40th anniversary meeting November 6. Installed as president was Harold G. Ray of San Francisco. Dr. Ray succeeds Harry Lyons of Richmond, Va. Robert G. Kesel of Chicago was chosen president-elect; Clarke E. Chamberlain of Peoria, Ill., secretary, and James E. Aiguier of Philadelphia, treasurer. Named to the executive council were B. O. A. Thomas of Seattle and Stanley C. Baker of Greenwood, S. C. Dr. Johnson and Dr. Chamberlain were elected to the American Board of Periodontology.

American Society of Oral Surgeons elected the following officers at its meeting in Hollywood, Fla., November 3-6. Stanley Rice, Beverly Hills, Calif., president; Harry M. Seldin, New York, president-elect; G. Thaddeus Gregory, Indianapolis, vice-president; Frank B. Hower, Louisville, Ky., secretary-treasurer. Appointed new member to the executive council was F. F. Pfeiffer of New York. Ruth F. Whalen was reappointed to the post of executive secretary. The 1955 meeting of the Society will be held in Los Angeles October 12-15.

American College of Dentists during its 34th annual convocation ceremonies November 7 awarded the degree Fellow of the College to 119 U. S. and Canadian dentists. Degrees were conferred in absentia on eight prominent European dentists. They are Henri Lennard Beyron and Gösta Lindblom of Stockholm, Sweden; Jean Deliberos of Paris, France; Sir William Kelsey Fry, Wallace Stewart Ross and Gerald H. Leatherman of London, England; Knut Gard of Oslo, Norway, and Poul O. Pedersen of Virum, Denmark. An honorary degree was awarded Herbert B. Bain, director of the American Dental Association Bureau of Public Information.

Officers elected by the College were James H. Ferguson, Jr., of Baltimore, president; Kenneth Pruden of Paterson, N. J., president-elect; Clemens V. Rault of Washington, D. C., vice-president, and Alfred E. Seyler of Detroit, editor. Don Gullett of Toronto, Canada, and S. Elsworth Davenport, Jr., of New York, were elected new members of the Board of Regents. Reelected were William N. Hodgkin of Warrenton, Va., treasurer, and William J. Gies of New York, historian.

American Academy of the History of Dentistry at its November 5 meeting announced the discovery of the original minutes of the world's first national dental organization. A complete set of minutes in manuscript of the American Society of Dental Surgeons, founded in 1840, was discovered among the papers

of the Children's Hospital of the city of Cincinnati, Van B. Dalton, chairman of the Academy's research committee, reported. It was the experience of this first national society and that of the American Dental Convention which followed it that prompted the adoption of the representative form of organization of the American Dental Association.

John E. Gurley of San Francisco was chosen president-elect of the Academy and William N. Hodgkin of Warrenton, Va., was inaugurated president. Continued in office were Harold L. Faggart, secretary-treasurer; Milton B. Asbell, vice-president, and George B. Denton, editor. Honorary memberships were bestowed on L. Pierce Anthony, a former editor of THE JOURNAL OF THE AMERICAN DENTAL ASSOCIATION; Frederick C. Waite, Ph.D., professor emeritus of the Dental School of Western Reserve University, and J. Menzies Campbell of Scotland, a leading dental historian.

American Denture Society awarded the $500 first prize in the Society's annual essay contest for dental students to Robert Sacherman of Youngstown, Ohio, for his essay on prosthetic dentistry. Dr. Sacherman was graduated from Western Reserve University School of Dentistry in June 1954.

In another action at its November 7 meeting, the Society installed Cecil H. Bliss of Sioux City, Iowa, as its president and elected Samuel S. Cohen of Cleveland, president-elect. Fred N. Harris of Pasadena, Calif., is vice-president, and Arthur L. Roberts of Aurora, Ill., secretary-treasurer.

American Academy of Pedodontics will continue its research and study club projects during the coming year, it was decided at the Academy's meeting November 5. The group also agreed to inaugurate the workshop technic at its 1955 meeting. Officers installed were Mott Erwin of Portland, Ore., president; Maury Massler of Chicago, vice-president; Elsie Schildwachter of Huntington Park, Calif., secretary, and David B. Law of Seattle, treasurer.

Pan American Council of Dentistry for Children held an organizational meeting November 5. At this session the group elected Samuel Harris of Detroit president and Antonio Montero of Havana, Cuba, secretary. Other officers will be elected when the Council holds its second meeting next year. No date or place has yet been selected for the 1955 meeting.

At the meeting members discussed ways in which the Council could help achieve better dentistry for children. It is expected that delegates to the Council will be selected from every country in the Western Hemisphere. Dentists attending this first session were from Cuba, Canada, Puerto Rico, Costa Rica, Panama, Mexico, Argentina and the United States.

Advisory Board for Dental Specialties at its November 7 meeting discussed various problems facing the specialties. Questions which will concern the group during the coming year include whether the dental schools should provide extension courses to permit dentists in outlying areas to meet specialty requirements and whether uniform procedures and standards of examinations by the different specialty boards are practical. Elected officers were Harold Leonard of New York, president; Col. Joseph Bernier of Washington, D. C., vice-president, and Raymond Nagle of New York, secretary-treasurer. The group's next meeting will be held in Chicago in February 1955.

American Dental Hygienists Association closed its six day meeting November 11 with the installation of the following officers: Sara Hill of Memphis, Tenn., president; Marjorie Thornton of Des Moines, Iowa, president-elect; March Fong of Oakland, Calif., first vice-president; Beth Linn of Milwaukee, Wis.,

second vice-president; Helen Garvey of Detroit, Mich., third vice-president; Margaret Swanson of Washington, D. C., secretary, and Ruth Heck of Philadelphia, treasurer. Elected trustees were Ethel Swimmer of Bridgeport, Conn., Nancy Horton of Greensboro, S. C., and Mary Marshall of Seattle.

American Dental Assistants Association, which met November 7-11, selected Ruth Doring of Montclair, N. J., as president. Selected president-elect was Bessie Peterson of Waterloo, Iowa. Completing the roster of officers are: Mary F. Dutton, of Macon, Ga., first vice-president; Magdalene Kulstad of LaHabra, Calif., second vice-president; Joy Phillips of Phoenix, Ariz., third vice-president; Elma Troutman of Dayton, Ohio, general secretary; Harriet Darling of Huron, S. D., treasurer; Gertrude Carhart of New York, Virginia Hoffman of Pittsburgh, Mae Collins of Canada City, Mo. and Marian Small of Tucson, Ariz., members of the board of trustees.

Delta Sigma Delta closed its four day meeting with the installation of the following officers: Myron Roberts of Buffalo N. Y., past supreme grand master; Virgil Kimmey of St. Louis, supreme grand master; George Redpath of Portland, Ore., supreme worthy master; Stephen G. Applegate of Detroit, scribe, and Edward Mimmack of Buffalo, treasurer. In addition, Cedric F. Harring of Brookline, Mass., was elected historian; Howard H. Burkhart of Coral Gables, Fla., senior page; Bert Dienstbier of Omaha, Neb., junior page, and Lon Porter of Houston, Texas, tyler.

American Dental Interfraternity Council elected the following officers at its meeting November 7. Pliny G. Puterbaugh of Peru, Ind., president; Floyd L. Paynter of Omaha, Neb., vice-president, and William S. Harman of Weirton, W. Va., secretary-treasurer.

Association Affairs

COUNCIL TO REVIEW DENTAL EDUCATION PROGRAMS

The Council on Dental Education will meet February 3 and 4 at the Central Office under the chairmanship of Philip E. Blackerby, Jr., new Council chairman. On the agenda will be reports on the dental schools that have been visited since the May 1954 meeting of the Council.

DESIGN PUBLICITY MATERIAL FOR DENTAL HEALTH WEEK

Portfolios of publicity and promotional material designed to assist constituent and component dental societies in their observance of National Children's Dental Health Week, February 7-13, were distributed by the Bureau of Public Information in December. In addition, the Bureau sent out nearly 300,000 copies of two posters for use in schools and community centers in conjunction with the

Dennis the Menace Says...
SEE? RUFF DON'T HARDLY EAT ANY SWEET STUFF... AN' LOOK HOW GOOD HIS TEETH ARE!
7th National Children's Dental Health Week
FEBRUARY 7-13, 1955

"Dennis the Menace" contributed by the artist Hank Ketchum appears on posters designed for use during National Children's Dental Health Week February 7-13. Posters may be obtained from the Association's Bureau of Public Information at the Central Office.

nation-wide event. Both posters carry the slogan "Fewer Sweets Mean Better Teeth."

One poster, in red and black, depicts two children writing on a blackboard. The second, in yellow and brown, carries a drawing of the famous comic strip character "Dennis the Menace." This "Dennis" drawing and a second cartoon featured in the Association Clipsheet were donated to the Association as a public service by Hank Ketcham, creator of "Dennis."

Copies of these posters and the other materials relating to Children's Dental Health Week may be obtained from the Bureau of Public Information at the Central Office.

In addition to the materials prepared by the Bureau, a special poster has been prepared by the International Apple Association, Inc., in cooperation with the American Dental Association. Available from the Apple Association, 1302 18th St., N.W., Washington 6, D.C., this poster emphasizes the importance of toothbrushing and the role of fruits in maintaining oral health. The dental health educational message on the poster has been approved by the Association Bureau of Dental Health Education.

ESSAY PROGRAM PLANNING TO START IN JANUARY

Planning the essay program for the Association's 96th annual session to be held in San Francisco October 17-20, 1955, will begin in January when the Council on Scientific Session meets with section officers January 28 and 29 at the Central Office. In December, a report on attendance at the essay program for the Miami meeting showed capacity crowds at nearly all essay presentations and symposiums, with the panel on newer devices for cutting tooth structure attracting the largest attendance.

R. H. FRIEDRICH CHOSEN FOR COUNCIL POST

R. H. Friedrich of Plainfield, N. J., has been chosen to serve as secretary of the Council on Dental Health, replacing W. Philip Phair, who resigned September 1. Dr. Friedrich's appointment became effective January 1.

Chairman of the Council on Federal Dental Services for six years, Dr. Friedrich appeared before Congressional committees on numerous occasions to present the Association's viewpoint on pending legislation. During 1954 he served as a professional consultant to the Medical Task Force of the Hoover Commission, which studied the work of federal agencies providing health services.

R. H. Friedrich

A graduate of Northwestern University Dental School, Dr. Friedrich took postgraduate training in oral surgery and began the practice of dentistry in Chicago. After a tour of duty with the Army Dental Corps, he began the practice of oral surgery in Plainfield, N. J.

Dr. Friedrich has served as clinical instructor in oral surgery at the University of Pennsylvania Dental School and is a consultant to the Department of Medicine and Surgery of the Veterans Administration. He is consultant in oral surgery also to the Surgeon General of the U.S. Army and to the Lyons Veterans Administration Hospital in Lyons, N. J.

Dr. Friedrich is a member of the

American Society of Oral Surgeons and is a Fellow of both the New York Academy of Dentistry and the American College of Dentists.

Named by Association president Daniel F. Lynch to replace Dr. Friedrich as chairman of the Council on Federal Dental Services is F. J. Reichmann of Oklahoma City.

PERRY SANDELL APPOINTED NEW BUREAU DIRECTOR

Perry J. Sandell of Chicago has been appointed director of the newly-established Bureau of Dental Health Education of the American Dental Association, Harold Hillenbrand, Association secretary, has announced. The new Bureau, established by the House of Delegates at its annual meeting in Miami, replaces the Division of Dental Health Education which operated as a unit of the Council on Dental Health. Mr. Sandell had been

Perry Sandell

director of the Division since 1952. The new Bureau was established to handle the greatly increased demand for dental health education materials from teachers, parents and health workers, Dr. Hillenbrand said.

In addition to his post as Bureau director, Mr. Sandell represents the Association on the Council on National Organizations of the Adult Education Association, the Committee for the Revision of School Health Policies and the School Health Section Council of the American Public Health Association. He is also associate editor of the *Journal of the American Association for Health, Physical Education and Recreation.*

Prior to joining the Association staff in 1952, Mr. Sandell served as director of health, physical education, recreation and safety in the Minnesota State Department of Education in St. Paul. He holds a Master's degree in education from the University of Minnesota and has taught in schools in Minnesota and North Dakota.

STATE SECRETARIES TO STUDY LABOR DENTAL CARE PLANS

A discussion of the problems faced by the constituent society in dealing with labor groups interested in dental care programs will be a major topic on the agenda of the Seventh State Secretaries' Management Conference January 17-19 at the Central Office. Also to be discussed are methods for the development and administration of constituent society programs, the problems and relations of the constituent society with the medical profession, ways of achieving effective liaison with state dental laboratory groups and programs for dental hygienists and assistants.

In discussing labor union dental care programs, the state secretaries will consider a number of questions among which are the following: should the dental society attempt to cooperate in the development of the dental care program, should first overtures in the development of such programs be made by the dental society, should the society be expected to subsidize the program through a schedule of less than normal fees, and should the society ask for an open panel, closed panel or both.

Participating in the program will be Lon W. Morrey, editor of THE JOURNAL;

Harold Hillenbrand, Association secretary; Harry Lyons, dean of the School of Dentistry, Medical College of Virginia; Bernard J. Conway, secretary of the Council on Dental Trade and Laboratory Relations; Shailer Peterson, secretary of the Council on Dental Education, and John R. Porter, legal counsel of the Chicago Dental Society.

$64,970 IN RELIEF FUND; DRIVE NEARS TWO-THIRDS MARK

Contributions to the $100,000 Relief Fund drive reached $64,969.86 on December 13, bringing the 1954-55 campaign near the two-thirds mark. Tennessee, the first society to exceed its quota, continued its lead with 202 per cent of quota contributed. Although five other societies and the U. S. Public Health Service had reached 100 per cent or more, contributions to the Fund lagged behind last year's pace by more than $4,000. Societies over the top were Alabama, Alaska, Montana, Nevada, Panama Canal Zone, U. S. Public Health Service and Tennessee.

The larger societies, with 65 per cent of quota paid in, maintained their initial lead over the smaller societies, which marked up 62 per cent of quota.

As of the December 13 date, students had contributed $572 and $240 had been given as memorials.

Contributions of the constituent societies were:

Quota over $925

	Quota	Contributions to December 13	Pct.
California	$ 3,820.00	$ 2,883.50	75.5
So. California	4,580.00	2,668.00	58.3
Colorado	960.00	426.00	44.4
Connecticut	1,940.00	1,381.50	71.2
Florida	1,380.00	1,028.50	74.5
Georgia	1,020.00	560.00	54.9
Illinois	7,240.00	5,382.06	74.3
Indiana	2,340.00	1,840.50	78.7
Iowa	1,780.00	1,587.00	89.2
Kansas	960.00	648.15	67.5
Kentucky	1,130.00	422.80	37.4
Louisiana	1,020.00	672.50	65.9
Maryland	1,060.00	845.00	79.7
Massachusetts	3,690.00	1,321.00	35.8
Michigan	4,100.00	3,000.50	73.2
Minnesota	2,840.00	2,020.05	71.1
Missouri	2,450.00	1,658.50	67.7
Nebraska	1,060.00	1,010.00	95.3
New Jersey	4,020.00	2,769.50	68.9
New York	15,200.00	7,215.00	47.5
N. Carolina	1,240.00	528.00	42.6
Ohio	4,920.00	3,124.25	63.5
Oregon	1,230.00	936.50	76.1
Pennsylvania	6,810.00	3,938.25	57.8
Tennessee	1,310.00	2,649.00	202.2
Texas	3,190.00	1,761.50	55.2
Virginia	1,150.00	837.50	72.8
Washington	1,800.00	1,554.50	86.4
Wisconsin	2,930.00	1,567.50	53.5
Total	$87,170.00	$56,237.06	64.5

Quota of $925 or less

	Quota	Contributions to December 13	Pct.
Air Force	$ 600.00	$ 211.75	35.3
Alabama	800.00	944.50	118.1
Alaska	60.00	95.00	158.3
Arizona	300.00	94.00	31.3
Arkansas	560.00	404.50	72.2
Army	580.00	237.50	40.9
Delaware	150.00	130.00	86.7
Dist. of Col.	830.00	635.00	76.5
Hawaii	350.00	113.00	32.3
Idaho	260.00	94.50	36.3
Maine	460.00	265.00	57.6
Mississippi	530.00	378.00	71.3
Montana	370.00	397.00	107.3
Navy	920.00	319.00	34.7
Nevada	100.00	100.00	100.0
N. Hampshire	300.00	173.00	57.7
New Mexico	240.00	185.50	77.3
North Dakota	330.00	234.05	70.9
Oklahoma	920.00	694.00	75.4
P. Canal Zone	10.00	10.00	100.0
P. Health Serv.	210.00	216.00	102.9
Puerto Rico	190.00	39.50	20.8
Rhode Island	560.00	318.00	56.8
So. Carolina	450.00	176.50	39.2
S. Dakota	350.00	97.00	27.7
Utah	470.00	417.50	88.8
Vermont	200.00	95.00	47.5
Vet. Admin.	810.00	200.00	24.7
West Virginia	760.00	530.50	69.8
Wyoming	160.00	114.50	71.6
Total	$12,830.00	$ 7,919.80	61.7

The publications of 38 constituent dental societies are mounted on a Trustee District map of the United States in this new exhibit prepared by the Council on Journalism. Data on the contents of each journal, giving such information as the number of issues per year, the amount of space devoted to scientific articles, news, editorials and advertising, are tabulated on one of the end panels. The exhibit stands eight feet high and 12 feet wide and may be borrowed from the Order Department at the Central Office.

DEADLINE FOR PAYMENT OF ASSOCIATION DUES MARCH 31

The deadline for payment of Association dues for the year 1955 according to the Constitution and Bylaws is March 31, Louis Cruttenden, assistant secretary, has announced. It is important that dues be remitted by the deadline, Dr. Cruttenden stated, as Association sponsored insurance carried by the member might be affected if the member is not in good standing. In addition, the delinquent member will not receive copies of THE JOURNAL after the March 31 date.

ELEVENTH DENTAL EDUCATION CONGRESS MEETS FEBRUARY 5

The meaning of accreditation will be discussed by the morning panel of the Eleventh Congress on Dental Education and Licensure February 5 at the Conrad Hilton Hotel in Chicago. The Congress is sponsored by the Association Council on Dental Education. Panel participants will consider the philosophy of an accrediting agency, the function of such an agency for the boards of dental examiners, for the dental schools, the universities and the profession.

In the afternoon a second panel will analyze the need of the public and the profession for dental specialties, the procedures of dental specialty boards in certifying diplomates and the recognition of dental specialists by state dental examining boards.

COUNCIL SPONSORS WORKSHOP ON DENTAL SPECIALTIES

Representatives of approved dental specialty boards, groups seeking recognition as specialties, dental schools, hospitals and state boards which license dental specialists will participate in the Workshop on Dental Specialty Problems sponsored by the Council on Dental Education. The Workshop will be held at the Central Office February 7 and may continue February 8, Philip E. Blackerby, Jr., Council chairman, has announced.

The Workshop will attempt to determine whether the definition of a dental specialty is sufficiently precise for use by the Council on Dental Education in considering which groups should be recognized as specialties, Dr. Blackerby said. In addition, conferees will discuss the procedures used by specialty boards in their activities and will discuss also the help such boards might render the Council in the evaluation of advanced dental specialty education programs.

ANALYZE ACCREDITATION PROCEDURES IN HEALTH FIELD

An informal meeting of representatives of groups in the health field to discuss the technics and standards used in accreditation programs was held November 22 in the Central Office under the sponsorship of the Council on Dental Education. Participating in the conference in addition to the American Dental Association were representatives of the American Medical Association, the Association of American Medical Colleges, the American Veterinary Medical Association and the American Council on Pharmaceutical Education.

In addition to the discussion of accreditation programs, the group considered the role that the professional accrediting agencies should play in determining the need for additional schools, Shailer Peterson, secretary of the Council on Dental Education, stated. The conferees also discussed ways in which accrediting agencies could assist the schools in securing needed faculty members.

"Your Dental Savings," a new exhibit produced by the Division of Dental Health Education, may be borrowed from the Order Department at the Central Office. Eight feet wide, seven and a half feet high and 16 inches deep, the exhibit emphasizes by means of lighted transparencies that an investment in toothbrushing, balanced diet, use of fluoride and regular dental care results in the benefits of dental health and general well-being.

DENTAL EXAMINERS COUNCIL TO DISCUSS NEW TESTS

The present battery of tests included in the National Board dental examinations will be reviewed at a meeting of the Council of the National Board of Dental Examiners February 7-8 at the Central Office. The group will review the tests in the light of present trends in dental education to determine if the present battery of tests is adequately testing in a sufficient number of areas of dental education.

In addition, the Council will review tests for March and December prepared by the test construction committees, which are composed of representatives of the schools and state examining boards from various parts of the country.

ALL-TIME HIGH IN NUMBER TAKING NATIONAL BOARDS

An all-time high in the number of dental school graduates taking the National Board examinations is reported for 1954, Victor L. Steffel, chairman of the Council of the National Board of Dental Examiners, has announced. For the year, 4,560 men were tested; 1,333 of them took the December examination. The December figure includes completions of parts and re-examinations, Dr. Steffel said.

Dr. Steffel reported also that an increasing number of dental men in military service are taking the examinations at their bases. Results of the December examinations will be available to the schools and applicants in the latter part of January.

EIGHT OF TEN DENTISTS NOW ASSOCIATION MEMBERS

Eight out of ten practicing dentists in the United States are now members of the American Dental Association, according to the Association's Bureau of Economic Research and Statistics. Membership figures continued to set records as the total reached 82,354 on November 30.

Included in the November figure were 72,436 dentists and 9,695 students. The Navy and 45 constituent societies registered gains during the year; one society's total remained the same and eight societies and the Air Force, Army, U. S. Public Health Service and Veterans Administration showed losses.

ACCEPTED DENTAL REMEDIES FOR 1955 ISSUED JANUARY 1

A revised section on nutrition, with emphasis on vitamin products, is one of the features of the 1955 edition of *Accepted Dental Remedies* issued January 1, announced J. Roy Doty, secretary of the Council on Dental Therapeutics. The publication contains the latest evaluations of nearly 800 dental drug products, among them a number of new antibiotics.

Among the subjects covered in the 207-page volume are anesthetics, dentifrices, central nervous system stimulants, dentifrices and symptoms and treatment of acute poisoning. For the first time, as a convenience to dentists, the addresses of distributors and manufacturers have been listed. Copies of the volume may be obtained for $2 from the Order Department at the Central Office.

MAIL CATALOGUE OF DENTAL HEALTH EDUCATION MATERIALS

A new catalogue listing the dental health education materials which may be obtained from the Central Office has been mailed to all Association members. The catalogue lists posters and pamphlets for use in the school and dental office, professional aids such as appointment books, directories and patient recall cards and audio-visual materials, including films, slides and exhibits.

Among the topics covered are fluoridation, methods for the development of school and community dental health programs, diet and dental health and the care of children's teeth. Copies of the catalogue may be obtained from the Bureau of Dental Health Education at the Central Office.

1955 EDITION OF DIRECTORY READY JANUARY 1

The 1955 edition of the American Dental Directory was ready for distribution January 1. Listing the names and addresses of more than 96,000 dentists in the United States, the Directory contains information also on key dental personnel in each state, the requirements of state dental examining boards, the list of dental schools and the names and addresses of national dental organizations of the world. The Directory may be ordered for $7.50 from the Order Department at the Central Office.

INDEX TO THE JOURNAL NOW AVAILABLE

The index to volume 49 of THE JOURNAL, covering issues of the last six months of 1954, is now available. Copies may be obtained free of charge from the Subscription Department at the Central Office, 222 E. Superior St., Chicago 11.

ROENTGENOGRAMS FROM MIAMI MEETING REPORTED LOST

A set of 42 roentgenograms belonging to Frank J. Gruchalla were lost from his exhibit "Preservation of the Tooth and Contiguous Tissues" at the scientific exhibit of the annual session in Miami. The roentgenograms were mounted in a black sheet of paper about 12 by 15 inches and included pictures of root fillings and resections, healing of a cystlike process after conservative root canal treatment, resection of an abscess involving four maxillary incisors and osteofibrosis around the apexes of lower anterior teeth.

Since the roentgenograms are not of significant value to anyone but Dr. Gruchalla, they apparently were picked up by mistake. They may be returned to Director of the Scientific Exhibit, American Dental Association, 222 E. Superior St., Chicago 11.

SELECTION OF MEETING SITES PREROGATIVE OF THE HOUSE

On page 730 of last month's issue, THE JOURNAL reported that the House of Delegates at its 95th annual session last November in Miami made the Board of Trustees responsible for selecting the sites for future Association meetings. This report was in error. Although the subject was thoroughly discussed on the floor of the House, the delegates, by final vote, elected to retain that responsibility.

Dental Societies

CHICAGO MIDWINTER MEETING PLANS CANCER PANEL

Current work in cancer will be the topic of a panel of the midwinter meeting of the Chicago Dental Society February 6-9, Walter E. Dundon, program chairman has announced. A panel on the handling of the grievances of patients has been scheduled also, Dr. Dundon said. In addition to the two panels, there will be 43 essays, 57 limited attendance clinics and 82 table clinics. Projected clinics and films are features of the meeting.

A special effort has been made by the Society to introduce new faces and new voices, and as a result 70 per cent of the essayists and 65 per cent of the clinicians will make their initial appearance on a Chicago midwinter program.

Participating in the panel on cancer will be H. B. G. Robinson, assistant dean of the College of Dentistry, Ohio State University, who will act as moderator; Ernest L. Wynder, M.D., director of the Memorial Center for Cancer and Allied Disease in New York; and George E. Moore, M.D., director of the Roswell Park Memorial Cancer Institute in Buffalo.

Participants in the panel on the handling of grievances of patients will be Harold Oppice, former president of the American Dental Association, moderator; Lloyd H. Dodd, lecturer on dental economics; Jay Eschleman, of the School of Dentistry, Temple University, and Don Miller, former president of the New York State Dental Society.

For the first time, the winner of the Chicago Dental Society's essay contest will be introduced at the general meeting and will receive a plaque in addition to the cash award.

GREATER NEW YORK MEETING ATTRACTS 16,588

A registration of 16,588 for the Greater New York Dental Meeting held in New York December 5-10 has been reported by Matthew Besdine, general chairman. The meeting, sponsored by the First and Second District Dental Societies of the State of New York, was operated as a postgraduate seminar. A feature of the meeting was a series of clinics on closed-circuit television. As one of the program's innovations, research scientists demonstrated materials, methods and equipment on which studies are presently being conducted.

On the opening day of the meeting, Daniel F. Lynch, president of the American Dental Association, was a guest on the Arthur Godfrey morning show, telecast nationally on the CBS network. Mr. Godfrey took this occasion to praise the work of the dental profession.

HONOR PRESIDENT LYNCH AT SOCIETY DINNER

Daniel F. Lynch, president of the Association, will be honored February 14 at a testimonial dinner of the District of Columbia Dental Society at the Statler Hotel, Washington, D. C. Featured speaker will be Harold Hillenbrand, Association secretary.

Federal

FEDERAL AGENCIES FORM COUNCIL ON DENTAL AFFAIRS

Formation of an Inter-Agency Council on Dental Affairs, composed of representatives of ten departments and agencies of the federal government concerned with dentistry, was announced at the end of November. The new council is headed by Leo J. Schoeny, dentist member of the Health Resources Advisory Committee of the Office of Defense Mobilization. Formation of the Council marks the first time that an effort has been made to coordinate the activities of the government relating to the dental profession. Previously, such efforts have been limited mainly to military and defense matters.

"We are primarily concerned with discussions of problems common to all agencies of the federal government that have any connection with dentistry, members of the dental profession or dental care programs," Dr. Schoeny said. Through discussion of common problems and the experience of the various agencies the Council expects to improve the handling of dental matters by these agencies. Among major items of concern to the Council, Dr. Schoeny said, are the more effective utilization of dental officers and auxiliary personnel in the Armed Forces, the training of dental auxiliary personnel, recruitment of den-

tal officers, particularly career officers, and dental research.

Following are the agencies represented on the new Council together with the officially designated representatives of the agency. When two names are listed, the second individual serves as alternate. Additional agencies are expected to join the Council at a later date.

Department of Defense:
Thomas P. Fox, dentist member of the Advisory Committee to the Assistant Secretary of Defense for Health and Medical Affairs.

Army:
Maj. Gen. Oscar P. Snyder, chief of the Dental Corps; Col. George F. Jeffcott, assistant chief of the Dental Corps.

Navy:
Rear. Adm. Daniel W. Ryan, chief of the Dental Corps; Capt. Bernard H. Faubion, deputy chief of the Dental Corps.

Air Force:
Brig. Gen. Marvin E. Kennebeck, chief of the dental service; Col. John K. Sitzman, chief of the professional division of the dental service.

Veterans Administration:
John E. Fauber, dental director; Sherman A. Pyfrin, deputy director.

U. S. Public Health Service:
John W. Knutson, chief dental officer; Walter J. Pelton, chief of the division of dental resources.

Selective Service:
Col. Richard Eanes, chief medical officer.

Bureau of the Budget:
Mr. Fred McNamara.

Civil Service Commission:
Verne K. Harvey, M.D., chief of the medical division, bureau of departmental operations.

Department of Interior:
James R. Shaw, chief of the health branch, Bureau of Indian Affairs; Leland E. Weyer, chief of the dental branch, division of hospitals, U. S. Public Health Service.

Public Health

SUPREME COURT RULING AIDS FIGHT FOR FLUORIDATION

In a decision which would appear to settle effectively all questions of the constitutionality of fluoridation, the United States Supreme Court December 6 left standing a ruling of the Louisiana high court which upheld the constitutionality of fluoridation. The Supreme Court, in its first direct ruling on the health measure, refused to consider the case in which some citizens of Shreveport, La., claimed that fluoridation violated their rights under the Fourteenth Amendment. The court said the case involved no federal question worthy of consideration.

Previously, on June 7, the Supreme Court had declined to review a decision of the Supreme Court of California upholding the right of the city of San Diego to initiate the fluoridation procedure.

Another decision favorable to fluoridation was handed down in the State of Washington December 2. On that date, the State Supreme Court upheld the measure's constitutionality. Concurring in the decision of the Superior Court of Lewis County, which found fluoridation to be a proper exercise of the health authority of a city, the high court denied that Arthur A. Kaul, who brought the suit, had been deprived of his liberty. The Court stated, "Liberty implies the absence of arbitrary restraint. It does not necessarily imply immunity from reasonable regulations imposed in the interests of the community."

Elsewhere, additional support for fluoridation was reported. Added to the ever-growing list of organizations favoring the health measure was the American Pharmaceutical Association. In a decision by its House of Delegates at the

group's August convention, the Association endorsed "the policy of the American Dental Association on the subject of fluoridation of drinking water."

THREE NAMED DIPLOMATES OF PUBLIC HEALTH BOARD

Three dentists, Polly Ayers of Birmingham, Ala.; Leonard F. Menczer of West Hartford, Conn., and Jacob M. Wisan of Philadelphia, Pa., have been certified as Diplomates of the American Board of Dental Public Health as a result of the certifying examination given by the Board in Miami, Fla., November 4 and 5.

The Board will hold its next examination October 13 and 14 in San Francisco. Candidates for this examination must submit their applications not later than June 15, the Board has announced. Application forms may be obtained from the secretary, Philip E. Blackerby, Jr., 250 Champion St., Battle Creek, Mich.

USPHS TO COMMISSION 5,000 RESERVE OFFICERS BY 1956

Some 5,000 United States Public Health Service officers are to be commissioned for emergency service by the end of the 1955-56 fiscal year under a major expansion and reorganization program of the USPHS Commissioned Reserve, Surgeon General Leonard A. Scheele has announced. Initially, the emphasis will be on the commissioning of physicians, dentists, sanitary engineers and nurses.

The expansion is being undertaken as a result of new defense responsibilities recently assigned to the USPHS. Strengthening of the Commissioned Reserve is expected to facilitate effective utilization of professional personnel with public health training in the event of a national emergency. Officers are to be trained to handle health problems associated with atomic, biological and chemical warfare.

An officer in the Commissioned Reserve will be called to active duty without his consent only in the event of a national emergency, Dr. Scheele stated, and in the call-up consideration will be given to health services the officer is already performing.

In addition to building up the Commissioned Reserve, the USPHS is stepping up research in disaster health problems and is developing a program to reinforce state and local health departments in time of national crisis.

SCIENCE GROUP PUBLISHES BOOK ON FLUORIDATION

Fluoridation as a Public Health Measure, edited by James H. Shaw and published by the American Association for the Advancement of Science, may be ordered from the AAAS, 1515 Massachusetts Ave., N. W., Washington, D.C. Various authors have contributed chapters to the volume, which presents a roundup of the scientific information on fluoridation.

USPHS EXAMINATIONS TO BE HELD IN MARCH

A competitive examination for appointment to the U.S. Public Health Service will be held in various places throughout the country March 15-18. Appointments provide opportunities for career service in clinical dental practice, dental public health and dental research. An assistant dental surgeon with dependents will receive $6,017 a year and a senior dental surgeon with dependents $6,918. Active duty as a USPHS officer fulfills the obligation of selective service.

Requirements for appointment are U.S. citizenship, graduation from a recognized school of dentistry and seven to ten years of collegiate and professional training and experience.

Application forms may be obtained from the chief of the division of person-

nel, U.S. Public Health Service, Department of Health, Education and Welfare, Washington 25, D. C. Applications must be filed no later than February 9.

Research

ULTRASONIC DRILL STILL IN RESEARCH STAGE, FIRM STATES

The application of ultrasonic vibrations to dentistry "is still in the research and experimental stage," according to the Ritter Company of Rochester, N. Y., a firm which has been working since 1944 on the application of ultrasonics to medicine and dentistry. In a letter released to the dental trade, the company stated, "For ten years we have been conducting research in this field . . . we have strongly concurred in the opinion of eminent dental authorities, publicly expressed again in papers delivered on November 9, 1954, at the Annual Meeting of the American Dental Association in Miami, that a great deal of physical, biological and clinical research must be conducted before ultrasonic vibrations can be generally accepted as a desirable technique for use in the human mouth. Very little such work has yet been done."

The letter continued, "As soon as the ultrasonic principle has been physically and clinically proven, and accepted by dental authorities, the Ritter Company will make its ultrasonic instrument available to the dental profession through our regular trade channels. We are informed that at least a year or two more will be required for the completion of this important phase of the project."

The company pointed out also that even with the perfecting of the instrument, the ultrasonic drill would not displace the dental engine, which will still be needed for "a multitude of operational techniques and certain cavity preparations."

Dental Education

SETON HALL SIGNS LEASE ON MEDICAL CENTER

Jersey City granted a 50-year lease to Seton Hall University in December giving the University use of the city's medical center for its College of Medicine and Dentistry, which was formally established last August. Archbishop Thomas A. Boland, acting as president of the University's board of trustees, and Mayor Bernard J. Berry signed the agreement. The new college will be New Jersey's first medical and dental school.

The lease provides that Seton Hall pay an annual rent of $275,000 for the facilities. The school expects to spend at least $1,000,000 on reconstruction, officials stated. Among those participating in the ceremonies which marked the signing of the agreement were Elton Lance, M.D., head of the state medical society, and William Giblin, president of the state dental association.

Mayor of Jersey City Bernard J. Berry (left) scans the lease which gives Seton Hall University use of the city's Medical Center for a new dental school. Seated (l. to r.) next to Mayor Berry are Msgr. John L. McNulty, president of the University, and Earl Halligan, M.D., acting director of the Medical Center. Standing (l. to r.) are William Giblin, head of the New Jersey State Dental Society, and Elton Lance, M.D., head of the State Medical Society.

HARRY STRUSSER AWARD ESTABLISHED AT SCHOOL

An award in honor of the late Harry Strusser, former director of the dental division at the New York City Department of Health, has been established at the New York University College of Dentistry, Dean Raymond J. Nagle announced December 12. Funds for the award were presented to the College by the Dr. Harry Strusser Memorial Fund Committee.

The award, a gold medal, is to be given to the senior student at the College who shows "the most promise in the field of public health dentistry." The Memorial Fund was created by friends of Dr. Strusser "as a demonstration of respect and appreciation for the efforts and leadership demonstrated by Dr. Strusser in the field of public health and the ideals exemplified during his professional life in the broad field of dentistry."

ALLAN BRODIE TO RESIGN AS DEAN OF ILLINOIS COLLEGE

Allan C. Brodie, dean of the University of Illinois College of Dentistry, has asked that he be relieved of his deanship September 1, 1955. Dr. Brodie has been dean since 1944. President of the University, Lloyd Morey, has appointed a faculty committee to aid in the selection of a new dean. Dr. Brodie will continue on the faculty part time and will continue his private practice of orthodontics.

DEAN OF WASHINGTON SCHOOL, ERNEST JONES, RESIGNS

The University of Washington Board of Regents in December approved the request of Ernest M. Jones to be relieved as dean of the School of Dentistry and granted him a six months' leave of absence. Dr. Jones, dean of the school since its establishment in 1945, has been in poor health for several months. He is scheduled to return to the faculty as professor of operative dentistry next July. A Health Science Division faculty committee has been named to make recommendations for a new dean.

DENTAL SCHOOLS SCHEDULE GRADUATE COURSES

New York • The 1955 series of refresher lectures at the New York University College of Dentistry in New York will begin January 13. The lectures, sponsored by the College's alumni association, will begin with a discussion on partial denture planning as a means of maintaining oral health and function. Speaker January 13 is Clyde H. Schuyler of New York. Subjects of succeeding lectures will be periodontics and oral medicine, evaluation and analysis of current methods of cavity preparation, and crown and bridge prosthesis. Tickets may be obtained without charge from the alumni association office, 100 Washington Sq., New York 3.

Southern California • Offered by the University of Southern California School of Dentistry during the winter and spring terms are courses in full denture construction, periodontology, root canal therapy and dentistry for children. Full denture construction is offered January 3-8, dentistry for children, January 24-28, periodontology, February 9 and 10 and practical root canal therapy, March 16-19. Further information may be obtained from the School in Los Angeles.

Washington (Seattle) • A refresher course in oral roentgenology will be presented by the University of Washington School of Dentistry in Seattle February 10-13. The course will include instruction in the mechanics of roentgenographic apparatus, in darkroom procedures and in protection against the hazards of roentgenography. Each participant will be

assigned three patients for whom he will expose, process and mount full-mouth roentgenograms.

BAYLOR RECEIVES FUNDS FOR SCHOOL OF DENTAL HYGIENE

Funds to equip and start the first school of dental hygiene in the Southwest were given Baylor University College of Dentistry by the Caruth Foundation and W. W. Caruth, Jr., of Dallas, Texas, Harry B. McCarthy, dean of the College, announced November 27. The 30,000 dollar grant will fully equip clinics, offices, classrooms and laboratories for the new school, which will be housed in the recently completed Basic Science Building of the dental college.

It is expected that the Caruth School of Dental Hygiene, as the school is to be named, will enroll 30 girls in each class. The course is scheduled to begin September 1955.

National Defense

CAPTAIN SCHANTZ HEADS NAVY DENTAL SCHOOL

In a change of command ceremony held November 15 at the National Naval Medical Center in Bethesda, Md., Capt. Curtiss W. Schantz, (DC) USN, relieved Rear Admiral Ralph W. Taylor as commanding officer of the Naval Dental School. Captain Schantz, a graduate of Marquette University, has served in the regular Navy since 1930. His tours of duty have been both in the States and in the Pacific.

On completion in 1943 of an assignment at Pearl Harbor, Captain Shantz became senior assistant and then senior dental officer of the U. S. Naval Training Center in San Diego.

In a ceremony at the National Naval Medical Center, Bethesda, Md., November 15, Rear Admiral Ralph W. Taylor, (DC) USN, (left) was relieved as commanding officer of the Naval Dental School by Capt. Curtiss W. Schantz, (DC) USN, (right).

Prior to assuming his new post as commanding officer of the Naval Dental School, Captain Shantz served as Force Dental Officer, Service Force, Pacific Fleet, with additional duty on the staff of the Commander-in-Chief, Pacific Fleet, and as Dental Officer, Naval Academy, Annapolis, Md.

OLDER MEN MAY BE CALLED UNDER DRAFT INSTRUCTIONS

The national headquarters of the Selective Service System in December instructed local boards to continue processing dental special registrants remaining in Priorities I and II and to begin processing Priority III men born on or after January 1, 1910. Although under this order dental special registrants in Priority III up to the age of 45 may be issued induction notices, it is expected that induction notices will be issued first to those men in the younger age groups.

An earlier information release issued by the National Advisory Committee to

Selective Service states that Selective Service does not now plan to conduct a complete re-evaluation and re-examination of dental registrants in the IV-F classification.

Men called will fill the quota of 459 dentists already set for the three month period beginning in April.

SET SECOND CIVIL DEFENSE COURSE FOR DENTISTS

A second course in civil defense designed especially for dentists has been arranged by the Federal Civil Defense Administration. The course will be given at the Staff College in Olney, Md., February 16-18.

The decision to offer the program a second time came as a result of the highly successful class held last May when 67 dentists from 24 states attended a three-day session. The February course will cover the same material; civil defense organization and training, the effects of nuclear, chemical and biologic warfare, and the special role of dentists in civil defense.

There is no fee for the course. Participants may live on the college grounds and pay $5 a day for room and board. Application should be made immediately to the FCDA Staff College at Olney, Md.

CIVIL DEFENSE NEWSLETTER ISSUED FOR DENTISTS

A civil defense newsletter designed for dentists is now being issued by the Federal Civil Defense Administration at Battle Creek, Mich., Russell W. Bunting, dental consultant to the FCDA, has announced. The first issue, which appeared late in November, described Army and Navy training films which are in the process of being released for use by dental societies. The newsletter told also about outstanding projects being carried on by dentists in Detroit and Shamokin, Pa. Dentists who wish to receive the publication may write to Dr. Bunting, dental consultant, Federal Civil Defense Administration, Battle Creek, Mich.

International

AUSTRALIAN DENTISTS ELECT OFFICERS OCTOBER 16

New officers of the Australian Dental Association elected at the Association's October 16 meeting are: K. T. Adamson, president; A. G. Rowell, vice-president; N. E. Edney, interstate vice-president; J. M. Wark, honorary secretary, and R. G. Williams, honorary treasurer. The Association reports that its federal office has been moved to 147 Collins St., Melbourne, Victoria.

PANAMA CANAL ZONE SOCIETY CALLS ANNIVERSARY MEETING

A meeting in celebration of the 25th anniversary of the Panama Canal Zone Dental Society has been called for February 17, Society secretary-treasurer Cmdr. Alan L. Teitel, (DC) USNR, has announced. An all-day affair terminating with a dinner-dance at the Army and Navy Club at Fort Amador, Canal Zone, is planned. Featured speaker for the meeting is Daniel F. Lynch, president of the American Dental Association.

CANADIAN DENTISTS COVERED BY BLUE CROSS

Members of the Canadian Dental Association are covered under the Blue Cross Plan, according to the December issue of the Canadian Dental Association's Governors' Letter. The required number of C.D.A. members applied by the November 30 deadline, and benefits went into effect December 31.

General

PAUL SCHEMAN APPOINTED HILLSIDE DENTAL DIRECTOR

Paul Scheman of Brooklyn has been appointed director of dentistry at Hillside Hospital in Glen Oaks, N. Y. He succeeds the late Barnett A. Kessler, who organized the dental department 12 years ago to provide dental care for the emotionally disturbed patient.

Dr. Scheman is a Diplomate of the New York State Board of Oral Surgery, a Fellow of the Long Island Academy of Odontology and a member of the New York Institute of Oral Pathology. In addition to his post at Hillside Hospital, Dr. Scheman is in charge of oral pathology at Queens General Hospital.

In an additional appointment, the Hospital selected Gordon J. Rubin for the post of associate director of dentistry. Dr. Rubin has served on the staff of Hillside Hospital for about five years. He is a graduate of the School of Dentistry of the University of Pennsylvania.

HINMAN CLINIC TO HOLD MARCH MEETING

The Thomas P. Hinman Mid-Winter Clinic, to be held March 20-23 at the Municipal Auditorium in Atlanta, Ga., is planning a comprehensive essay program to cover the various aspects of dentistry. Participants who have already confirmed their engagement include Daniel F. Lynch, president of the American Dental Association; Col. Joseph L. Bernier, Washington, D. C.; Ralph W. Ireland, Lincoln, Neb.; Gordon W. Johnston, Toronto, Canada; Carl R. Oman, New York; S. Howard Payne, Buffalo, and LeRoy W. Peterson, St. Louis.

Also • Henry A. Swanson of Washington, D. C., former vice-president of the American Dental Association, is the first dentist to become chairman of the Scientific Advisory Board of Consultants to the Armed Forces Institute of Pathology. . . . Among the organizations holding meetings in early February are the Philadelphia County Dental Society, Philadelphia, February 2-5; American Association of Endodontics, Chicago, February 5 and 6, and American Denture Society, Chicago, February 4 and 5. . . . Also meeting are the American Academy of Restorative Dentistry, February 5 and 6, and American Academy of Maxillofacial Prosthetics, Chicago, February 5 and 6. . . . Brig. Gen. Charles A. Lindbergh turned over the $500 Pulitzer Prize award money won by his biography, *The Spirit of St. Louis,* to Columbia University's School of Dental and Oral Surgery. . . . In a decision affecting many dental research scientists, the Tax Court of the United States has ruled that research and study grants from philanthropic organizations are not subject to income tax. The decision reverses an earlier ruling. . . . Charles W. Freeman, professor of oral surgery at the Northwestern University Dental School, has been granted a leave beginning in February to do research in Australia and New Zealand.

Washington News Letter

Whether the doctor draft law, or some variation thereof, is to be extended a second time is still anyone's guess as a new Congress prepares to take up the broad question of universal military service.

The Department of Defense reportedly is content to let the law authorizing conscription of physicians and dentists expire next June, on the premise that numbers sufficient to meet military requirements can be obtained thereafter under provisions of the regular draft act, which is virtually certain to be extended.

However, within the armed services themselves misgivings are being expressed —privately, rather than publicly. There are doubts that even minimum needs for professional personnel can be met unless the special law enacted in 1950 and extended in 1952 is again continued. In the meantime, draft boards throughout the country are attempting to fill the orders which they received from Selective Service headquarters a few weeks before Christmas for 459 dentists and 1,275 physicians.

This latest requisition for dentists authorizes induction of registrants in Priority III (nonveterans) born on or since January 1, 1910. Thus it is probable that some dentists who have passed their forty-fifth birthday will receive notices from their draft boards this winter suggesting that they volunteer for military commissions or face the likelihood of being inducted as enlisted men.

According to the latest monthly compilation by Selective Service, the total on October 31, 1954, of Priority III dentists who were in 1-A and physically acceptable for induction stood at 3,938. In Priorities I and II were 121 and 81 dentists, respectively, who faced induction ahead of members of the Priority III group.

In view of the fact that this pool of Priorities I, II and III dentists who are in I-A and physically qualified totals 4,140, exclusive of more than 600 others adjudged available for service but still awaiting physical examination, it occasioned some surprise that Selective Service estimated some 45-year-olds would have to be taken in 1955 in order to fill a call for 459 dentists. Whether such a step actually will be necessary will not be known until March, which is the call up month.

GROUP DENTAL CARE REPORT

Public Health Service has begun distribution of *Comprehensive Dental Care in a Group Practice,* a 48-page special report based on a study of professional experiences in the dental department of Group Health Association, Inc. GHA is a voluntary, nonprofit clinic that was established in Washington in 1937 to furnish medical services on a prepayment basis. Six years ago it inaugurated a dental care program, offering services to members and their dependents on a fee basis.

The staff has averaged three full-time and eight part-time dentists. Each has a chairside assistant and other personnel include two hygienists, three laboratory technicians, one x-ray technician, appointment clerks and dental counselor.

The study conducted by USPHS Division of Dental Resources, in cooperation with Harold A. Eskew, dental director, and other officials of GHA, explored types of services rendered to patients, frequency of visits and chair time per person. The study group consisted of

1,925 men, women and children. Economic factors did not come within the study's scope.

RESEARCH GRANTS

On recommendation of the National Advisory Dental Research Council, the U.S. Public Health Service has approved 11 grants aggregating $84,074. Following are the names of institutional recipients and investigators, together with grant:

Harvard University, four grants, Paul H. Keyes, $7,981; Paul L. Munson, $13,000; Alexander D. Kenny, $8,500, and James H. Shaw, $11,708; Emory University, Francis Brinkley, $5,000; M. D. Anderson Hospital of the University of Texas, Sumter S. Arnim, $9,430; University of Pittsburgh, Gerald J. Cox, $4,480; University of Minnesota, Wallace Armstrong, $10,540; Michigan State University, Harrison R. Hunt, $2,095; Clemson College, Floyd R. Brownley, $3,240; University of Kansas City, Hugh I. Myers, $8,100.

FLUORIDATION

A compilation by the dental public health division in the U.S. Public Health Service disclosed that in the elections of last November fluoridation of community water supplies was approved by referendum in six communities and defeated in 19 others.

Over the past few years, municipal voting on fluoridation has resulted in 82 victories and 100 defeats. As of November 22, a total of 1,034 communities with 20,250,000 inhabitants were getting their drinking water from fluoridated supplies. This was exclusive of an estimated 4,000,000 whose supplies carried a natural fluorine content of 0.7 ppm or higher.

In the eighty-third Congress, the House Interstate and Foreign Commerce Committee conducted public hearings on a bill which would have prohibited fluoridation. No action was taken on the measure, but it may well be reintroduced in 1955.

International Correspondence

NEWS FROM GREAT BRITAIN

The National Health Service Act passed by the British Government eight years ago, writes W. Stewart Ross, was founded on the principle that the good health of a nation should be the responsibility of the Government and should not be dependent on the wealth of individuals. It would have been foolish to have expected a revolutionary measure such as this to have had a smooth passage from its inception, and it will be left to the historians of another generation to pass judgment on the benefit that such a bill has been. Few, however, would disagree with the fact that, despite all the headaches and problems that have arisen within the profession, many hundreds of thousands of people are receiving dental treatment which they could not possibly have afforded in the past. Now another measure, of equal seriousness to the dental profession of this country, will almost certainly be passed by the Government in the near future.

The proposed dental bill probably will contain provision for an experiment to train dental nurses in the treatment of the teeth of school children. The British Dental Association has announced its opposition to this ancillary work. Indeed the Association would not be fulfilling its duty to the public or the profession if it lamely accepted a measure which envisaged the treatment of children by people trained for approximately half the time that is considered necessary to produce dental surgeons. Statistics, however, show that there is an acute shortage of students in the dental schools and that in ten years there is a distinct possibility that there will be only 10,500 dentists on the Register. It would be ignoring the principles of common sense if our legislators turned a blind eye to the possibilities of the situation and did not explore every channel in an endeavor to prevent a complete breakdown of the School Dental Service and possibly even of the National Health Service itself.

Although objecting to ancillary workers, the British Dental Association has no intention of entirely ignoring a measure which affects so vitally the whole of the profession. The Representative Board of the Association will make every endeavor to see that the proposed bill contains clauses which will adequately protect the public and the profession. When this endeavor is coupled with the fact that the profession itself will be the arbitrator of the proposed experiment, there would appear to be little reason to fear the outcome of an expedient which, with all its shortcomings, is designed for the welfare of children's teeth.

NATIONAL HEALTH SERVICE

Jack Gilbert tells us of recent figures of the gross payments made to practitioners in the General Dental Service for the year 1953-54.

Although a comparatively small proportion of the total returns has been published it is fair to accept those available as reasonably representative. The average gross payments to a practitioner (the net figure can be assessed from an expense ratio of 54 per cent) vary amazingly from region to region and even from town to town. The lowest so far received is £2,020 in Bury in Lancashire and the highest £3,633 for Barnsley in Yorkshire. The variations appear to have no simple cause. The average gross income in Bury is £2,020 and at Rochdale, but seven miles away, the average is £2,995. That the average gross income of the practitioner working in the General Dental Service in Barnsley is 180 per cent of that of his colleague similarly employed in Bury is of far more than statistical interest. Such wide variations in the earnings of dentists under the National Health Service over the country as a whole introduce serious problems when alterations to the scale of fees are contemplated.

An increase of 10 per cent on the fees would provide an additional £363 for the Barnsley practitioner but his colleague in Bury, whose need is far greater, would gain by only £202, thus further increasing the undesirable discrepancy which now exists. An attempt to solve the problem by varying the scale of fees for certain regions would introduce such complications and anomalies that it would be impractical. Local prosperity or unemployment undoubtedly accounts for some of the differences, particularly since the introduction of the requirement making most adults responsible for payment of a part of the cost of treatment. Local as well as national economics play too large a part in the provision of dental treatment; areas of financial depression also suffer a dental health "depression."

THE TEACHING SCHOOLS

The teaching of periodontology in the dental schools of Great Britain, writes Professor H. H. Stones, has lagged behind that of most other subjects in the dental curriculum. Probably as a consequence of this the prevention and treatment of periodontal disease by the dental practitioner has left much to be desired when compared to the attention paid to conservative dentistry (operative dentistry) and prosthetics. In recent years the dental schools have realized the fundamental importance of the gingival and periodontal tissues, and now, out of the 16 schools in Great Britain and Northern Ireland, ten have departments for this subject. In the other schools the teaching of periodontics is the responsibility of one of the other departments. Nearly all of the ten schools have a full-time lecturer (or in several instances two part-time lecturers) of varying status for this particular subject.

The General Medical Council in its 1952 recommendations concerning the dental curriculum states that ten lectures or demonstrations should be given in periodontal disease and that clinical instruction should be given throughout the period of dental hospital practice. It is recommended that a candidate's knowledge of periodontal disease should be tested and that practical examinations should be so arranged that any candidate may be required to undergo a test on the treatment of periodontal disease.

The Dental Education Advisory Council of the dental schools of Great Britain and Ireland sponsored a meeting of teachers of periodontics in September 1954. The relation of periodontics to the whole dental curriculum was discussed. It was agreed that teaching of the subject should be started at the same time as that of the other clinical subjects and should be continued throughout the remainder of the course. The basic importance of diagnosis was stressed. It was considered that instruction in pathology should precede clinical practice and that whenever possible the principles of general pathology should be illustrated immediately by reference to periodontal pathology. The need for close integration of periodontics with other aspects of dentistry, both clinical and preclinical, was emphasized; the student has to be taught the importance of assessing and treating the teeth and mouth as a whole whatever may be the department in which he is receiving instruction. The classification and nomenclature of periodontal diseases should be based primarily on pathology, but it was felt that there was not sufficient knowledge about the basic pathological changes of the periodontal tissues to classify all the conditions.

ROYAL COLLEGE OF SURGEONS

Professor F. W. Wilkinson has been re-elected dean of the Faculty of Dental Surgery and F. S. Warner, vice-dean. Plans for the new department of dental science at the Royal College of Surgeons are progressing more rapidly than was anticipated, and it seems possible that the department will be built and ready to start work in less than two years. Sir Wilfred Fish has been appointed by the Council of the College to be the director of the new department, and the committee is actively considering means of raising the necessary funds to endow the research that will be carried out there.

Sir William Kelsey Fry, W. Stewart Ross and Gerald H. Leatherman have been elected Fellows of the American College of Dentists.

Congratulations to J. Menzies Campbell who, in recognition of his outstanding contribution to the history of dentistry, was unanimously elected an Honorary Member of the American Academy of the History of Dentistry at its third annual meeting in Miami, Fla., November 5, 1954.

Gerald H. Leatherman,
D.M.D., F.D.S.R.C.S.

Use of epinephrine in connection with procaine in dental procedures

There have been so many diverse opinions regarding the unfavorable action of epinephrine when used in connection with procaine for dental and oral surgical procedures that the Council of the New York Institute of Clinical Oral Pathology decided to get an authoritative opinion which could be used as a guide by the dental practitioner in the care of patients who suffer from diseases of the heart and the circulatory system. Correspondence pertaining to the study and the report itself follows:

On December 10, 1953, the following letter was addressed to the New York Heart Association:

Our Institute is most interested to get an opinion on the use of epinephrine in connection with procaine as a local anesthetic in patients with diseases of the heart and circulatory system. The opinions of heart specialists are so divergent that in the interest of the medical and dental professions this subject should be referred to a special committee for study.

The correspondence was completed with a letter from the New York Heart Association under date of October 5, 1954:

In further answer to your letter of April 16, 1954, regarding the use of epinephrine in dental practice on cardiac patients,

This matter has been carefully studied by a committee appointed by the New York Heart Association for that purpose. I believe the enclosed report of this committee is a complete answer to the question which you have raised. This report has been approved by our policy committee for transmission to you.

Please let me know of any further information you may wish to request.

REPORT OF THE SPECIAL COMMITTEE OF THE NEW YORK HEART ASSOCIATION, INC. ON THE USE OF EPINEPHRINE IN CONNECTION WITH PROCAINE IN DENTAL PROCEDURES

Your committee submits the following report on the use of epinephrine in connection with procaine as a local anesthetic for dental procedures in patients with diseases of the heart and circulatory system:

1. It is our understanding of common dental practice that epinephrine is used in dilutions of 1:50,000 and occasionally 1:100,000; never more concentrated than 1:50,000. Rarely more than 2.0 cc. of solution are used in any one session.

2. Epinephrine is combined with a local anesthetic, commonly procaine. One of the pharmacologic actions of procaine is to counteract the tendency of epinephrine to cause cardiac irregularities.

3. The dentist should have information from the physician about the nature and severity of the heart disease in the patient. He should also have knowledge of medication the patient is receiving, particularly such medication as might increase the activity of epinephrine. This knowledge is important because ordinary dental procedures may produce some emotional stress and cause cardiac disturbance which might be wrongly attributed to epinephrine.

4. Under these conditions and with these precautions, the use of epinephrine with procaine for dental surgery presents no special hazards in persons with heart disease. We would recommend for any one session that there be used no more than 10.0 cc. of 1:50,000 epinephrine—no more than 0.2 mgm. of epinephrine in any form.

The Policy and Budget Committee of the New York Heart Association has given approval to the publication of the report which the Council of the New York Institute of Clinical Oral Pathology considers so important that it deserves wide publicity.

The Reader Comments

THE JOURNAL *devotes this section to comment by readers on topics of current interest to dentistry. The editor reserves the right to edit all communications to fit available space and requires that all letters be signed. At the request of the author, signatures will be deleted before publication. Printed communications do not necessarily reflect the opinion or official policy of the Association. Your participation in this section is invited.*

The Editor

ANSWERS CRITICISM OF PAPER ON PENICILLIN G POTASSIUM AND CALCIUM CARBONATE PASTE

It is necessary to correct the letter by Helmut A. Zander which appeared on page 258 of the August issue of THE JOURNAL. The letter discussed the paper "The Effect of Penicillin G Potassium Plus Calcium Carbonate on Surgically Exposed Dental Pulps of the Rhesus Monkey" published in THE JOURNAL in May. Since there are not only misinterpretations of the observations but also many misquotations, we are listing the statements from the letter together with the applicable quotations from our article.

Statements from letter	*Quotation from article*
This paper recommends the use of a penicillin G potassium and calcium carbonate paste in the treatment of exposed dental pulps.	The use of the penicillin compound as a prophylactic in the treatment of surgically exposed dental pulps seems to be indicated by the results of this experiment. Further study is necessary to indicate whether the penicillin compound can be used successfully in carious exposures where gross infection has been introduced into the pulp tissue.

Comment • At no time was the paste recommended for general treatment of the exposed dental pulp

In 8 of these teeth the fillings were either lost or loose so that there were 3 teeth left which could be used for the study.	All the teeth in which the penicillin G potassium and calcium carbonate had been placed over the pulps contained a white substance which filled a large portion of the prepared cavity. The pulp tissue was in direct contact with this white substance.

Comment • Only the cement coverings were lost. In all cases the paste served as effective fillings.

The title and contents of Seelig's paper are misleading because they give the impression that the new paste mixture was responsible for the healing of the pulp, whereas in actuality, the paste only prevented the ill effects of the cement.	The effect of penicillin G potassium plus calcium carbonate on surgically exposed dental pulps of the rhesus monkey.

Comment • The title merely indicates the experiment, and the content describes the procedure and observations. Only in the conclusion was the effect of the paste evaluated—and then solely in regard to surgically exposed pulps.

Statements from letter

I believe it is below the dignity of THE JOURNAL to print papers that come to important conclusions in regard to treatment based upon 1 animal, 3 teeth, 1 control tooth and no control as regards the two components of the paste.

Quotation from article

Summary of paragraph describing the 20 teeth used:

Exposed	18
Experimental paste	11
Zinc oxide and eugenol (control)	4
Cement (control)	1
No filling (control)	2
Not exposed (control)	2

Comment • As can be seen by the figures, 9 teeth were used as controls and were compared with the 11 in which the experimental paste was applied and found effective.

As stated in the introduction to the article, this was the first report of a series of experiments. Further studies on 11 additional animals have duplicated the original results. In some of the experiments, calcium carbonate was used under gutta percha and under cement. In both instances, abscess formation took place.

Alexander Seelig
David Tanchester

Book Reviews

THE DIET AND MASTICATION THEIR EFFECTS ON DIFFUSION AND ON THE INCEPTION OF DENTAL CARIES

By R. B. Nevin, B.D.S. 43 pages with 9 illustrations. No price listed. Dunedin, New Zealand, Progress Printing Company Ltd., 1954.

This monograph develops Nevin's hypothesis relating to the local effects of food textures and masticatory function on the incidence of caries. The author describes apparatus and methods for measuring the rates of diffusion of acid substances into and out of narrow spaces that simulate those found in and between the teeth. Nevin considers this subject important because, he says, previously published studies have not attempted to correlate caries incidence with the processes occurring in these protected areas of high-caries susceptibility.

The results of his tests indicate that the masticatory function causes rapid entry of sugar into spaces and that the rate of loss of sugar will normally be much slower than the rate of entry. Ingestion of sugar products between meals will decrease diffusion gradients. The carious process is more continuous in fissures. Therefore, when evaluating caries control measures, all new caries should be reported in terms of the tooth surface involved.

Dorothea F. Radusch

THE ROENTGENOLOGIST IN COURT

By Samuel Wright Donaldson, M. D. Second edition. 348 pages. Index. Price $7.75. Springfield, Ill., Charles C Thomas, 1954.

Dr. Donaldson has approached his subject with a physician's viewpoint and has made interesting reading, for the most part, of material that could be difficult to understand. He covers the subject of medical law thoroughly, from malpractice through criminal law, as it applies to medicine and dentistry.

The book applies most directly to the roentgenologist, but, as the author points out, "The courts have stated with emphasis that radiography must be used routinely in order to practice dentistry with ordinary care, skill and diligence." From this standpoint, then, there is value in the book for all who practice dentistry.

Where states have made different interpretations of cases, the decisions are classified and states are listed as having interpreted them one way or the other, so one can understand how the law has been interpreted in each state.

Because of the chapter relating to dentistry, this edition would be of help in preparing the dentist to take the stand if and when necessary.

Henry Cline Fixott, Jr.

PROBLEMS OF AGING: TRANSACTIONS OF THE FIFTEENTH (1953) CONFERENCE

Edited by Nathan W. Shock, Ph.D. 213 pages with 68 figures. Index. Price $4.25. Packanack Lake, N. J., Josiah Macy, Jr. Foundation, 1954.

The book presents seven discussions which took place at the 15th Conference on Problems of Aging. A biographical roll call acquaints the reader with the wide span of knowledge of the Conference participants.

Warren Andrew describes changes in cellular structure correlated with aging in various animals. The cells were those of brain, parotid gland and anterior pituitary. Bacon F. Chow discusses biochemical studies showing alteration of interrelationships of enzymes during aging. F. Bourliere presents the growth and aging patterns of warm blooded and cold blooded animals to show that those with the lower metabolic rates are most likely to be the longer living species. Hibernation is a factor in the aging pattern. Wild animals seldom reach maximum age because of the depredations of their enemies.

Much discussion centers around the criteria of aging. As expressed by Lawrence K. Frank, "Some people prefer a structural one, some a pathological one, some a biochemical one." The discussions range over the whole gamut of aging from enzyme systems through cell structures, whole cells, tissues, to whole animals.

The three principal discussions are documented with citations to the literature, but many of the fascinating comments are based on passing reference to individuals. Clive M. McCay reviews the 17 years of support of these Conferences by the Macy Foundation.

Gerald J. Cox

DIE ZAHNÄRZTLICHE BEHANDLUNG DES KINDES (THE DENTAL TREATMENT OF THE CHILD)

Collection of the reports and discussions at the Congress of the Swiss Dental Association at Bürgenstock May 15-17, 1953. 176 pages with 137 illustrations. Price sFr. 14. Zürich, Switzerland, Buchdruckerei Berichthaus, 1954.

Among the topics discussed in the 21 reports included in this volume are: school care of teeth, treatment of deciduous teeth, fluorine and the thyroid glands, experimental diet and caries, use of prefabricated crowns, handling of fractures, and anesthesia for children.

The practical aspect of children's dentistry is emphasized in all the reports and in the discussions which follow each report. In the report on the "Practice of Dentistry for Children," it is recommended that all equipment and technics be adapted for children—a special chair, appropriate drugs and suitable methods of injection, exceptional care in early detection of caries and conservation of the deciduous teeth.

Though the volume provides little new material for the pedodontist, it does offer valid information and sound advice.

G. Nichols

ÜBER DEN EINFLUSS DER SALZPASTE SELGIN AUF DIE SPEICHELKÖRPERCHEN (ON THE EFFECT OF SELGIN SALT PASTE ON THE SALIVA PARTICLES). FASC. 6. ODONTOLOGICA. ABHANDLUNGEN AUS DEM GESAMTEN GEBIET DER ZAHNHEILKUNDE

By Benedikt Venzin, Dr. med. dent. 24 pages with 5 illustrations. Basel, Benno Schwabe & Co., 1953.

The author maintains that too little attention has been paid to the effect of a tooth paste on the dental substance, on the gingiva and especially on the saliva particles.

From data gathered in 5 cases of gingivitis, the author shows that the number of saliva particles is considerably reduced in the course of the disease. In his opinion therefore an increase in the number of saliva particles is beneficial to the teeth.

Selgin salt paste contains 10.5 per cent sodium chloride by weight. In a study of 35 cases, varying in degree of dental health and oral hygiene, the author found that the use of Selgin salt paste resulted in a highly significant increase in the number of saliva particles. He concluded that the use of the paste increases the protective power of saliva.

The reader is left with two questions: (1) Was the author's study method scientific? (2) How would other tooth pastes compare with Selgin salt paste?

G. Nichols

DIE LEBENDERHALTUNG DER PULPA IN DER KONSERVIERENDEN ZAHNHEILKUNDE (THE PRESERVATION OF THE PULP IN CONSERVATIVE DENTISTRY)

By Luigi Castagnola, Dr. 127 pages with 55 illustrations. Index. Price 13.80 M. Munchen, Carl Hanser Verlag, 1953.

In this volume the author examines completely and carefully the problem of pulp capping. The main question constantly kept before the reader is: When should and can the dentist make the effort to preserve endangered pulp?

After reviewing the origin and development of procedures for pulp capping and defining the common terms, the author analyzes the methods and presents excellently illustrated evidence of the results achieved, especially during the past two years. He concludes that calcium hydroxide is the most successful means of preserving endangered pulp, that other means are too difficult to apply or result only in occasional success. He warns that regardless of the means used, the critical phase of the operation is the sealing of the pulp and that every tooth with a capped pulp must be checked by roentgenographic examinations.

The author himself is impressed with the reparative power of the pulp. He considers the rare success with the new drugs as an indication that some day a drug may be found that will preserve not only the whole pulp but even the inflamed pulp.

G. Nichols

Current Literature

JOURNAL OF DENTAL RESEARCH
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THE pH OF THE PERIODONTAL POCKET AND THE GLYCOGEN CONTENT OF THE ADJACENT TISSUE

B. K. Forscher, A. G. Paulsen and W. C. Hess, p. 444.

The preparation of an improved microantimony electrode is described. The mean pH of periodontal pockets in chronic periodontitis was found to be 7.09 ± 0.07 with no significant variation in relation to the depth of the pocket. A semimicro analysis of tissue for glycogen is described. The mean glycogen content of normal gingival tissue was found to be 0.185 ± 0.031 per cent. The glycogen content of tissue adjacent to periodontal pockets was found to vary inversely with the depth of the pocket. The tissue associated with the shallowest pockets has a higher glycogen than normal tissue. The tissue associated with the deep pockets has a glycogen content in the same range as normal tissue.

BACTERIAL FACTORS IN NONSPECIFIC GINGIVITIS

S. Schultz-Haudt, M. A. Bruce and B. G. Bibby, p. 454.

A differential count in different regions of the gingiva and of the tooth surface in 25 individuals with nonspecific marginal gingivitis and ten patients with normal gingiva revealed a definite pattern of distribution of various bacterial types. In nonspecific gingivitis there was an increase in the total number of organisms in all regions over the number found in normal gingiva and a relative increase in the percentages of spirochetes, fusiforms, and vibrios, as well as gram-negative cocci.

Injection and aspiration of saline solution in the gingiva and the study of stained sections for bacteria failed to reveal bacteria in the deeper gingival tissues.

To determine whether products of bacterial activity can cause gingival inflammation, bacteria-free filtrates were prepared from bacteria collected from the gingival margin by freezing and thawing or by filtration through sintered glass. Some of the filtrates thus prepared gave hyperemic reactions in sensitized skin of rabbits. In most tests, filtrates produced spreading of carbon particles in rabbit skin which corresponded with the spreading produced by hyaluronidase.

The mechanism of the production of gingivitis by bacteria is discussed.

MITOTIC ACTIVITY IN THE PERIODONTAL TISSUES OF THE RAT MOLAR

H. R. Muhlemann, H. A. Zander and Franz Halberg, p. 459.

Thirty-one black male rats, five months of age, were kept on *ad libitum* feeding, singly housed, in a room maintained at 78° ± 2° F., illuminated from 6:00 A.M. to 6:00 P.M. Day-night differences in the number of mitoses were noted for the retromolar epithelium and for the connective tissue of the periodontal membrane. A comparison of these mitotic rhythms with the 24 hour periodicities in body temperature and in the number of circulating eosinophils suggests that certain oral structures follow the 24 hour periodic pattern of function in the organism as a whole. Distribution patterns of mitoses within the periodontal membrane and along the molar roots are described.

A FAILURE TO PRODUCE ENLARGEMENT OF GINGIVA IN RATS BY USING DILANTIN SODIUM

Henry M. Swenson, p. 468.

Thirty-six albino rats were divided into four groups of nine rats each. The animals in two of these groups had stainless steel wire around the lower anterior teeth to act as an irritant to the gingiva. One group with the wire and one group without the wire received daily injections intraperitoneally of 1.0 mg. of diphenylhydantoin sodium (Dilantin) for 90 days. The remaining rats were used as controls. No change in the gingiva was observed grossly or microscopically after the administration of this drug.

STUDIES OF THE RESPIRATION OF THE MICROBIAL FLORA OF HUMAN SALIVA

George W. Burnett, p. 469.

HISTOLOGIC RESPONSE TO TOOTH MOVEMENT IN THE LABORATORY RAT

Charles M. Waldo and Julian M. Rothblatt, p. 481.

Previous studies of tissue response to tooth movement in dogs, monkeys and human beings

have involved complicated technics and have been limited to small numbers of experimental subjects, usually of unknown genetic background and metabolic status. The laboratory rat is used in a new method which affords greatly increased possibilities for experimental control and which allows the use of larger numbers of animals. Using a specially designed instrument, a segment of rubber band 0.8 mm. in cross section was inserted under ether anesthesia between the maxillary right first and second molars of rats weighing 100 to 150 Gm.

Definite separation was obtained in 24 hours, maximal separation in three days. Histologic evidence of remodeling with bone resorption and deposition in regions of pressure and tension accompanied the separation. The most intense effect was seen in the upper right experimental quadrant where hemorrhage, compression of the periodontal membranes and undermining resorption often result from excessive stress on the first and second molar teeth. The intensity of the response was diminished around the maxillary third molar tooth and was even less in the lower opposing quadrant, where occlusal adjustment occurred.

There were no demonstrable changes in the upper and lower left quadrants, thus providing a control in each animal studied. Mechanical interference brought about by this simple "orthodontic appliance" is reproducible with a high degree of standardization. Work is now in progress with this method to study the effects of metabolic factors on tissue response to tooth movement.

STUDIES OF THE COMPOSITION OF TEETH. I. CHEMICAL ANALYSIS FOR THE PRINCIPAL INORGANIC CONSTITUENTS OF THE ENAMEL AND DENTIN FROM SYRIAN HAMSTERS

Ralph R. Lobene and George W. Burnett, p. 487.

CALCIFICATION XI. STUDIES OF THE INCORPORATION OF CITRATE IN CALCIFICATION IN VITRO

Albert Edward Sobel, Harry Goldenberg and Emanuel Schmerzler, p. 497.

The citrate:PO_4 ratios of the new minerals deposited during calcification *in vitro* are related to the citrate:PO_4 ratios of the fluid. This may be taken as further evidence for the hypothesis that variations of the composition of mineral deposits in the body are related to variations in composition of the fluid from which the deposits form. There was no evidence of citrate incorporation in the absence of citrate in the fluid above the small amount of citrate initially present.

THE SOLUBILITY OF ENAMEL SURFACES

H. R. Sullivan, p. 504.

The solubility of intact and ground enamel surfaces was investigated by a technic wherein small glass tubes were cemented on the enamel surfaces and a series of applications of acid was made to the areas within the tubes. The amount of phosphorus liberated from the enamel by each successive application of acid was determined. It was found that there was some evidence that the enamel of unerupted teeth was more soluble than that of erupted teeth and that the external layers of enamel were less soluble than the corresponding subsurfaces. The relative insolubility of the external layers may indicate the existence of a hypocalcified zone of enamel at the external surface of the tooth.

THERMAL CONDUCTIVITY OF DENTAL CEMENT

Ralph W. Phillips, Richard H. Reinking and Lloyd J. Phillips, p. 511.

A method is presented for measuring thermal conductivity of dental cement. The method differs somewhat from the apparatus employed by Lisanti and Zander who measured the conductivity of dentin. Results obtained on three commercial cements indicate that under dry conditions the thermal conductivity of the cements is slightly higher than that of dentin.

THE BEHAVIOR AND MEASUREMENT OF HYGROSCOPIC EXPANSION OF DENTAL CASTING INVESTMENT

K. Asgarzadeh, D. B. Mahler and F. A. Peyton, p. 519.

An evaluation of the present methods of measuring hygroscopic expansion was made, and it was found desirable to devise a method more consistent with the true over-all expansion. A volumetric measurement was designed which yielded a more consistent parameter. A four-section inlay ring was made to allow for measurements in the lateral direction, as well as to afford a constant minimum resistance to expansion in this direction. Using this volumetric measurement, the behavior of hygroscopic expanding investments was studied, and it was found that the addition of a

metered amount of water would consistently yield an expansion reproducible within closer limits than any previous method. Also the data derived from these volumetric measurements indicated behavior characteristics of hygroscopic expansion which heretofore have not been manifest.

EFFECT OF METHYLCHOLANTHRENE ON TOOTH GERM TRANSPLANTS: ADDITIONAL STUDIES

Harold S. Fleming, p. 531.

The effect of 20-methylcholanthrene on transplanted tooth germs was studied. Guinea pigs received transplants treated with this carcinogenic chemical to the eyes and brains, and mice (dba Bar Harbor) received them to the axillae. With each series of treated transfers, untreated transfers were made to serve as controls. Transplants were allowed to remain in place from 100 days to more than a year, and the hosts were sacrificed at regular intervals.

When the explants were recovered, several staining methods were employed. Therefore, the recovered tissues were fixed as designated for the particular stain to be used. Besides the regular hematoxylin and eosin stain, Massons' and the Barnett-Seligman staining methods were employed.

These studies confirm previous observations on the presence of keratin in methylcholanthrene treated explants. Persistence of epithelial remnants of the original explant was more evident in the presence of methylcholanthrene than in its absence. Treated explants to the brains and axillae frequently attained a large size. In the axillae, recovered transfers were generally much larger in males than in females who had several litters during the course of the experiment. Persisting cells, presumably of the outer enamel epithelium, seemed to have some malignant characteristics but did not actually become malignant within the period of this experiment.

THE EFFECTS OF SEVERAL FLUORIDE REAGENTS ON THE STRUCTURE OF WHOLE TEETH

Robert B. Fischer, H. Neil Elsheimer and J. C. Muhler, p. 538.

Roentgenographic data indicate that whole teeth structures are altered in a way similar to the way powdered enamel structures are altered by treatment with fluoride reagents, insofar as concerns gross changes from an apatite structure to an entirely different structure.

DENTAL CARIES PREVALENCE IN CHILDREN 15 AND 16 YEARS OF AGE IN THREE IDAHO COMMUNITIES

Kathleen O. Porter and Ella Woods, p. 542.

Dental examinations are reported for 215 children 15 and 16 years of age, who were continuous residents of three Idaho communities: Coeur d'Alene, Boise and Nampa. The water supplies of these communities contained 0.0, 0.5 and 1.5 ppm fluorides, respectively. The difference in caries prevalence between the children examined in Boise and Nampa was not significant. Caries prevalence in the Coeur d'Alene group was more than twice that in the Boise and Nampa groups. Factors which may be involved in the severe dental health problem in the Coeur d'Alene area are the lack of fluorides and minerals in the water and soil, and climatic conditions.

Nearly one half the total number of carious teeth were discovered by posterior bitewing roentgenographic examination, but the percentage by which the average number of DMF teeth for each group of subjects was increased by the inclusion of these teeth was only 15 to 21 per cent.

CARIES EXPERIENCE AMONG INSTITUTIONALIZED CHILDREN IN THE PACIFIC NORTHWEST

Theodore Suher, John P. Dickson and D. M. Hadjimarkos, p. 552.

The caries experience of 327 school children from the ages of 6 through 14 years, living in four institutions located in the states of Oregon and Washington, was determined by means of mouth mirror and explorer. The caries experience of the subjects was expressed in terms of DMF and def teeth. The results of the investigation showed that the children examined had a high susceptibility to caries attack. The average number of DMF teeth of the 6 year old child was 2.06 and the number increased to 14.95 DMF teeth at the age of 14 years.

These results are not in agreement with the generally accepted opinion that institutionalized children tend to be less susceptible to caries attack than noninstitutionalized children. The over-all food intake of the children while in residence at the institutions showed that their diet could be considered well balanced. That the children of this study lived away from the institutions during the summer months may have been the main factor in the high caries experience rate.

DENTAL CARIES IN CARIES-SUSCEPTIBLE AND CARIES-RESISTANT ALBINO RATS (RATTUS NORVEGICUS) IN THE ABSENCE OF SECRETIONS OF THE PAROTID GLAND

R. F. Keller, H. R. Hunt and C. A. Hoppert, p. 558.

The parotid ducts and parts of the parotid glands were removed from caries-susceptible and caries-resistant albino rats (Rattus norvegicus) of the Hunt-Hoppert strains. The elimination of parotid secretions in this manner did not greatly alter the number of days required for the onset of the first macroscopic carious lesion.

A METHOD FOR STUDY OF ACID PRODUCTION BY SALIVARY SEDIMENTS

R. S. Manly, p. 561.

Equipment has been assembled and tested for study of the rate of acid production by sediment obtained from whole saliva using an *in vitro* system which permits control of some of the important variables. The equipment consists of three pairs of glass electrodes, with a common calomel electrode, connected through an automatic switch to an industrial pH meter and a six-place automatic recorder.

Paraffin-stimulated saliva is centrifuged for 20 minutes at 2,400 rpm., and 0.1 ml. of the precipitate obtained therefrom is held in contact with a glass electrode by means of a thimble of nylon mesh. The sediment derived from the saliva of some persons forms acid rapidly and reaches an equilibrium pH about 2 units below that of the solution in contact with the sediment. This solution contains 0.2 molar glucose and 0.01 molar CO_2-$NaHCO_3$ buffer. The influence of inhibitors can be observed from their effect on the pH differential at equilibrium. Agitation and buffer capacity of the solution have been shown to be factors capable of affecting the equilibrium pH.

THE EFFECT OF SODIUM COPPER CHLOROPHYLLIN ON PURE CULTURES OF ORAL-TYPE ORGANISMS

T. A. Nevin and B. G. Bibby, p. 571.

The application of standard testing methods has demonstrated a bacteriostatic action by chlorophyll on pure cultures of staphylococci, streptococci and lactobacilli. Concurrent studies revealed that on a unit cell basis, glycolysis was not adversely affected and may be stimulated.

The irreversibility of the chlorophyllin inhibition by required vitamins and salts in 10 and 100 times the minimal concentrations required for growth was established with *Streptococcus salivarius* (American Type Culture Collection no. 9756) in Smiley's synthetic medium.

Experiments conducted using a Warburg respirometer showed chlorophyllin interference with the normal utilization of oxygen by *Str. salivarius* and five strains of staphylococci.

The addition of chlorophyllin in various concentrations to Smiley's synthetic medium showed that the oxidation-reduction potential of the medium could be altered as much as 100 millivolts in favor of oxidation when tested at pH 7.0 and 30° C., using a Beckman potentiometer with a Pt. electrode.

RANGE OF HISTOLOGIC VARIATION IN CLINICALLY NORMAL GINGIVA

Leo Zachinsky, p. 580.

An exploration of the degree of variation in an unselected series of 38 gingival biopsies taken from normal mouths illustrates the range of histologic difference within a nonpathological standard. Epithelial variations found include differences in the total thickness in the order of x2, deep to shallow rete pegs, and almost predominant parakeratosis rather than "skin-type" keratin on the surface, the presence of varying degrees of intracytoplasmic vacuolization.

The most striking submucosal variations included sparse to heavy vascularity, varying densities of chronic inflammatory exudate, a broad range of variation in the extent of polymerization of collagen matrix, and fiber bundles ranging from reticular to dense and almost hyalinized.

Extension of the rigid definition of gingival normality to include a wider range of histologic variations seems desirable in order to clarify concepts of gingival pathology. Wide diversity of architectural patterns exist in normal gingivae.

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ORAL LYMPHOSARCOMA

Harry M. Seldin, S. Daniel Seldin and William Rakower. J. Oral Surg. 12:3 Jan. 1954.

Lymphosarcoma is a highly malignant, invasive tumor composed of mature or immature lymphocytes. This disease may develop where-

ever lymphoid tissue is present. It may be generalized with widespread metastases, or may be localized, involving only a single group of glands or lymphoid aggregate. The etiology of the disease is still unknown. The treatment of choice is roentgenotherapy. If the disease has a single center of origin and is treated early, the chances of cure are increased. It has been suggested that in case of localized lymphosarcoma, better results may be obtained by extirpative surgical procedures followed by local irradiation. The course of this disease is almost always progressive to death.

In four cases of lymphosarcoma of the oral and cervical regions, blood counts were essentially normal at the time of biopsy. All cases were treated with irradiation therapy. Two of the four patients died.

Any enlarged lymph node demands immediate investigation. Any node which does not disappear within three weeks should be regarded as a danger signal demanding complete investigation.

Herbert J. Bloom

ORAL INVOLVEMENT IN OSTEOPETROSIS

Milton Plotz and Harry J. Chakales. J. Oral Surg. 12:16 Jan. 1954.

Osteopetrosis is familial and congenital. It may be recognized in roentgenograms of the fetus. Few patients with this condition survive to adult life. In osteopetrosis, the characteristic structure of adult bone is lost. The cortex is extremely thick and encroaches on the medulla and on any foramens in the bone. The texture of the bone is chalky and brittle, and it can be drilled easily. The skeleton is fragile, and fractures are frequent even after slight trauma.

Obliteration of the blood-forming marrow results in anemia. Obliteration of the cranial nerve foramens may result in cranial nerve palsies. The foramens containing the alveolar arteries may be narrowed so that less blood is carried to the jaw, and necrosis may occur as a result of dental caries or after any operative procedure.

The correct diagnosis should be suggested by any of the following conditions, especially when they occur in combination: (1) anemia, (2) tendency to fracture readily, (3) characteristic facies, (4) cranial nerve palsies or (5) unusual bone denseness as shown in dental films. The three diseases which are most likely to cause confusion in diagnosis are Paget's disease, generalized carcinomatosis of bone, and osteomyelosclerosis of anemia and leukemia.

Herbert J. Bloom

NEURILEMMOMA OF THE HEAD AND NECK

C. Dean Couch, Jr. J. Oral Surg. 12:19 Jan. 1954.

Neurilemmoma is a neoplasm of a nerve sheath. It is a benign, slow-growing, painless, encapsulated neoplasm with malignant potentialities. It usually occurs as a solitary benign tumor located either superficially or deep in the skin or mucous membrane. When it occurs in the oral cavity, the tongue is its favorite site.

Neurilemmomas vary in size from a few millimeters to several centimeters. A neurilemmoma is generally a firm and well-defined mass; however, large lesions may become soft and fluctuant because of myxomatous or cystic degeneration.

A neurilemmoma is either encapsulated by or attached to the epineurium or perineurium. Degeneration into malignant neurilemmoma is not unknown.

Once the diagnosis of neurilemmoma has been made, treatment should be confined to complete excision with due consideration for the anatomy involved. Relatively few neurilemmomas recur locally after complete surgical excision by enucleation. Malignant metamorphosis is most often noted in the nerve trunks of the extremities.

Herbert J. Bloom

MULTIPLE EXTRACTIONS FOR THE HEMOPHILIAC

Frederick C. Nichols and Odus L. Baldridge. J. Oral Surg. 12:31 Jan. 1954

In hemophilia the primary deviation from the normal mechanism consists of a congenital and hereditary deficiency of thromboplastinogen. Since it is known also that the bleeding of the hemophiliac varies in degree at different times, the determination of the prothrombin consumption time may be an invaluable aid in selecting the most favorable period for elective oral surgery. For the hospitalized patient, several teeth may be removed at one time and single-rooted teeth which have been adequately prepared with elastic bands can be removed in the dental office with relative impunity.

The total size of the injured tissue region bears no relation to the duration of hemorrhage. The length of time required for clotting has no apparent bearing on the duration of postoperative hemorrhage. Pressure seems to be of value in the temporary control of hemorrhage for the hemophiliac, although the injudicious application of pressure can defeat

its purpose if the surrounding tissue is unduly traumatized.

When multiple extractions are contemplated for the hemophiliac, an effective way to apply pressure to the extraction sites is to extract alternate teeth as the first procedure. Small, half inch gauze rolls can be wedged in between the remaining teeth over the bleeding sockets. These may be saturated with a local hemostatic agent. The patient can then bite on one large central pack, placed so as to apply gentle pressure on all the smaller gauze rolls.

If the patient is debilitated, supportive therapy, including the use of multiple vitamins and other antianemic substances such as iron compounds, may be indicated in preoperative preparation for surgery. The only forms of therapy that are effective in controlling hemorrhage for these patients are daily transfusions of blood substances from normal donors to provide antihemophilic factors and local mechanical aids to provide temporary hemostasis during the time required for the tissues to heel.

Herbert J. Bloom

VERTICAL OSTEOTOMY IN THE MANDIBULAR RAMI FOR CORRECTION OF PROGNATHISM

Jack B. Caldwell and Gordon S. Letterman. J. Oral Surg. 12:185 July 1954.

A new operation for the correction of mandibular prognathism produces ideal results in patients with extreme deformity. By extraoral submandibular approach, a vertical osteotomy is performed in the rami of the mandible from the sigmoid notch downward over the mandibular foramen to the lower border of the mandible just anterior to the angle. By decortication and mortising of the sectional ramus, close approximation is obtained; and interosseous wiring assures clinical union within four weeks, at which time the patient is permitted to resume function.

Three case histories illustrate the application of the technic and the uniformly excellent results obtained. In addition to the minimal period of interdental fixation necessary there are numerous other advantages observed. Some of these are: (1) No special instruments or appliances are needed. (2) There is no appreciable change in the temporomandibular joint relation. (3) There is no sensory or motor nerve damage. (4) Vertical dimension, or denture space, is preserved. (5) The body of the mandible is not shortened anteroposteriorly. (6) An excellent cosmetic result is produced in all cases, a definite angle to the mandible is established, and there is no open bite deformity.

The chief disadvantage is the operating time, four to four and one-half hours; but this is not a serious drawback in view of the many advantages.

RETICULUM CELL SARCOMA OF THE CHIN

William F. Harrigan, Frank S. Butler and Arnold B. Schaffer. J. Oral Surg. 12:210 July 1954.

Most lymphosarcomas are associated with lymph nodes, though a lymphoma may develop anywhere in the body.

In one case, paresthesia of the lip and infection with pathologic fracture of the mandible were the obvious symptoms. The nerve irritation was thought to be due to infection; and the lymphoma was not suspected, since the tumor developed in a region of minimum lymphatic drainage with no primary nodal involvement.

The important point to note is that paresthesia as an initial symptom may occur when lymphomas or metastatic tumors are present.

CORRECTION OF MANDIBULAR PROGNATHISM BY INTRAORAL OSTECTOMY

Raymond F. Huebsch. J. Oral Surg. 12:214 July 1954.

Most operations for the surgical correction of mandibular prognathism by the resection of a segment of bone from the body of the mandible involve both intraoral and extraoral procedures in one or two stages. The patient is left with scars at the extraoral sites of the mandible.

In one case the operation was performed entirely from an intraoral approach, and the inferior alveolar nerve and vessels were preserved. The correction was performed first on study models in order to determine the segment of bone to be resected. A template of sheet copper was cut to correspond to the size of the segment.

The operation was performed under intranasal, endotracheal ether anesthesia. A 5 cm. incision was made along the crest of the alveolar ridge on either side of the mandible, extending from the ascending ramus to the second bicuspid. Where there were teeth, the interseptal papillae were cut.

Oblique incisions were made through the lingual and buccal surfaces of the mandible

down to the respective mucobuccal reflections in the bicuspid regions. Care was taken not to cut through the mental structures. The mucoperiosteal flaps were retracted buccally and lingually down to the inferior border of the bone. By this procedure the entire circumference of the body of the mandible was exposed.

The metal template was placed on the bone, and the segment of bone to be resected was outlined with an indelible pencil. With a bone-cutting bur, mounted in a contra-angle handpiece, cuts were made on the lines just through the cortical plates on the buccal, lingual, superior and inferior borders of the mandible.

The cut segment of cortical bone was removed with chisels and rongeur forceps. The cancellous bone was carefully removed between the cuts, and the inferior alveolar nerve and vessels were exposed. Care was taken not to injure these structures. For the right body of the mandible, a circumferential cut through the bone was all that was necessary to free the anterior portion of the mandible and to establish the correction. The teeth were brought into corrected occlusion, and the cut fragments were held in position by interosseous wiring. The mucoperiosteal flaps were sutured in their normal position to cover the exposed bone.

The teeth were held in corrected occlusion with intermaxillary wiring for a period of eight weeks, after which time there was clinical evidence of good fibrous union of the fragments. Paresthesia of the lower lip existed for about three months, after which time normal sensation returned. Roentgenograms in the sixth postoperative month revealed callous formation at the operative sites.

SEMIBURIED DENTURE IMPLANTS: REVIEW OF LITERATURE AND EXPERIMENTAL STUDY

Frederick C. Nichols. J. Oral Surg. 12: 217 July 1954.

In recent years the alloy called Vitallium has been proved to be nonreactive when completely buried as an implant in living tissues. The inertness of Vitallium has led to a revival of interest in the use of semiburied denture implants, in which several metal abutments projecting into the mouth are supported by a metal framework which is attached to an edentulous bony ridge.

The principle on which the semiburied denture implants are based, however, seems to controvert a basic physiological principle, since an unbroken layer of epithelium is the primary defense mechanism for all subjacent tissues. There is a definite organic union between oral epithelium and the normal human tooth, but no actual attachment between metal and epithelium could be expected to develop.

In order to determine what relationships do develop between oral epithelium and the abutments of semiburied denture implants, dogs were used as experimental animals. After the removal of teeth from one quadrant of the mouth of each of four dogs, direct impressions of the bony ridges were taken.

Over a period of months, six Vitallium implants, suitably modified in design from those now being used in human beings, were inserted. With each new implant, changes were made in design and technic in an attempt to improve clinical success. The final design, which was clinically the most successful, made use of circumferential wiring, rather than screws, to obtain initial retention for the implant and did not have a bar of metal on the crest of the edentulous ridge of bone.

The implants were left in position for varying periods of time, ranging from two to five months. The implants and their supporting segments of mandible and investing soft tissues were then removed en bloc. The specimens were quick-frozen and maintained in the frozen state while ground sections were made. Sagittal and cross sections were obtained and photographed; then the metal remnants were lifted out of their tissue beds. The tissues were decalcified, stained and sectioned in routine fashion to permit microscopic studies.

Clinical and histological studies resulted in the following observations: (1) Vitallium caused no discernible inflammatory reaction when completely buried in living tissues. (2) A stream of air directed at the collar of soft tissues surrounding the intraoral abutments caused the tissues to lift away from the metal. (3) Epithelial cells grew down between the metal abutments and subjacent connective tissues, with no evidence of any form of attachment or adhesion between metal and epithelium. (4) Epithelial downgrowth was a continuing process as long as the implants were in place, and eventually the metal bars forming the supporting structure of the implant were surrounded by epithelium for varying distances away from the abutments. (5) There was massive inflammatory infiltration of both epithelium and connective tissues in the regions surrounding the abutments. (6) Active osteoclasis beneath the metal bars originally in contact with bone resulted in the eventual interposition of a layer of connective tissue between bone and metal.

On the basis of experimental findings and in consideration of the physiological requirement of an intact epithelial covering for pro-

tection of underlying tissues, the following conclusions were drawn:

1. Semiburied denture implants in use in human beings today are based on an untenable principle, since epithelial continuity cannot be maintained in the presence of partially buried, partially exposed metal abutments.

2. In view of this fact, the indications for the use of semiburied denture implants should be re-evaluated.

TOOTH IN PARAPHARYNGEAL SPACE: REPORT OF CASE

J. A. Harpman. J. Oral Surg. 12:254 July 1954.

During removal of an impacted lower third molar, the tooth "turned turtle" and slipped into the tissues medial to the mandible. Pain, trismus and pyrexia developed. The tooth was thought to lie between bone and periosteum, but on surgical exploration was not found there. Further roentgenograms and the symptoms suggested that it lay in the pterygopharyngeal space, and removal of the tooth and drainage of the pterygopharyngeal space were done for fear of infection.

Lipiodol in the socket revealed no path. The operation was carried out under naso-endotracheal general anesthesia, with the help of localizing roentgenograms. The tooth and pus were found in the space, embedded in the medial aspect of the internal pterygoid muscle. After tonsillectomy a probe was passed into the space through the socket, the superior constrictor muscle and surrounding fascia were incised through the tonsil bed, and dissection was done along the internal pterygoid lateral to the pterygoid hamulus, which was exposed through a palatal incision.

Postoperatively, penicillin and streptomycin were given intramuscularly; there were discomfort and trismus, and discomfort in the tongue—possibly from interference with the glossopharyngeal nerve, but healing without disability soon resulted.

UNILATERAL HYPERPLASIA OF THE MANDIBULAR CONDYLE

Wilbur N. Van Zile. J. Oral Surg. 12:275 Oct. 1954.

Unilateral hypertrophy of the mandibular condyle is encountered infrequently and rarely has been reported in association with elongation of the ascending ramus. Etiologic factors in this disorder which have been considered in the past by various writers are rheumatoid arthritis, hemiplegia, trauma, familial inheritance and infections of the middle ear and temporomandibular joint. At present, the etiology is unknown.

Clinical manifestations of hyperplasia of the condyloid process are open bite on the affected side and asymmetry of the lower face. In many of the cases which have been reported in the literature there appears to be a slight overdevelopment of the maxilla and malar bones on the affected side. It is logical to assume that excessive growth of the affected condyloid process initiates further growth of the adjacent ascending ramus, maxilla and malar bones through functional stimulation of the associated musculature.

One condyloid process of the patient under discussion was 16 mm. longer and the ascending ramus 9 mm. longer than on the normal side. In centric occlusion, the maxillary and mandibular teeth were separated 7 mm. on the affected side.

Normal centric occlusion and facial symmetry were re-established by two surgical procedures. The first procedure consisted of a two-stage osteotomy of the left body of the mandible proximal to the last molar tooth. The teeth were then wired in occlusion. This operation restored normal centric occlusion while maintaining unchanged the length of the masseter, internal pterygoid muscle and temporalis muscle. One month later the diseased condyle was excised. An excellent functional and cosmetic result was obtained.

A MODIFICATION OF SIALOGRAPHIC TECHNIC

John G. Whinery. J. Oral Surg. 12:283 Oct. 1954.

Sialograms may reveal: (1) normal gland anatomy, (2) orderly displacement or distortion of ducts caused by benign tumors, (3) irregular filling of the gland caused by invasive tumors and (4) various degrees of the puddling that results from inflammatory degeneration of the gland.

The modification of sialographic technic consists of ligating the duct securely around the cannula with a silk suture. Under local anesthesia, a no. 0000 silk suture is passed through the mucosa to encircle the cannulated duct and is placed about 1 cm. from the aperture. This ligation prevents spilling of the radiopaque fluid and makes possible the filling of the gland with opaque fluid under pressure. The suture is removed promptly after satisfactory roentgenograms have been obtained.

Under pressure, the acini fills with opaque fluid. This filling of the glandular acini is thought to be a natural result of filling under pressure and not a sign of inflammatory degeneration of the gland as has been suggested by other writers. In the sialograms taken by the modified technic, the periphery of the gland becomes more distinct, and accessory ducts and gland tissue are made more apparent.

EARLY MANAGEMENT OF MAXILLOFACIAL WAR INJURIES

Bruno W. Kwapis. J. Oral Surg. 12:293 Oct. 1954.

A modern, efficient means of casualty evacuation permitted early primary treatment of over 200 patients with maxillofacial injuries from the Korean military campaign. Whole blood was always available for restoring patients in shock and preparing them for prolonged general anesthesia. Approximately 95 per cent of the maxillofacial casualties received a general anesthetic through endotracheal intubation.

The placement of well-trained oral surgeons in forward hospitals resulted in definitive treatment of the injury at the initial operation. This important step was responsible for decreased hospitalization time and the need for future plastic surgery. One of the most important contributions in maintaining a zero mortality rate for this class of injuries was the judicious use of the tracheotomy for patients with respiratory embarrassment.

Interdental wiring with elastic intermaxillary traction as the simplest and most direct fracture fixation technic was utilized in the majority of the cases. The external pin fixation and direct intraosseous wiring method was used also in cases in which the simpler procedures were not practical.

All facial wounds caused by missiles required débridement and primary soft tissue closure. The débridement of skin and bone was conservative. No osseous tissue was discarded regardless of the absence of periosteal attachment. This procedure applied to compound fractures as well. The vigorous irrigation with normal saline solution and elimination of oral contamination together with the use of the wide spectrum antibiotics reduced postoperative wound infection significantly.

Extensive undermining of the skin was frequently necessary to close wounds where there had been soft tissue loss. This step, together with the placement of inverted subcuticular sutures, permitted the use of fine silk for skin closure. Optimum cosmetic results were thus obtained. To insure success of the initial operation, a great deal of attention was given to sound postoperative care of the patient.

FURTHER CLINICAL OBSERVATIONS ON THE USE OF ANTIHISTAMINES IN ORAL SURGERY

Roland E. Silverman. J. Oral Surg. 12:310 Oct. 1954.

An additional investigation was made of the use of antihistamines in oral surgery. All statements were based on clinical observations only and must await laboratory confirmation. Improved results have been obtained with the injectable drugs as compared to those obtained were peroral drugs.

A theory is proposed that the release of histamine from traumatized tissue is responsible for the complications that sometimes follow surgical procedures, and that the specificity of the antihistaminic drugs against histamine brings about the improved results. Prior to surgery, a histamine blockade through the parenteral route may be established. Dosages described at present are experimental and are based on the weight and age of the patient. Personality also appears to be a factor to be considered for it has been noted that unstable individuals do not tolerate trauma as well as stable ones and appear to require increased dosages. A new injectable drug (Chlor-Trimeton Maleate Injection—100 mg. per cc.) was studied.

Results when antihistamines are used in connection with barbiturates are diminution of vomiting and tremors and a more immediate reaction time. Results in oral surgery include diminution of edema, trismus, bleeding and pain. More rapid healing is seen and dry sockets are now considered a minor problem.

HETEROTROPHIC TONSIL LOCATED IN THE FLOOR OF THE MOUTH: REPORT OF A CASE

Robert L. Shapiro. J. Oral Surg. 12:327 Oct. 1954.

A patient was seen who had a heterotrophic tonsil in the floor of the mouth, just lingual to the right mandibular bicuspid. The final diagnosis was not made until after an excision biopsy of the tumor, since in physical appearance and location it resembled a papilloma or fibroma. No definite information concern-

ing the rate of growth or the original appearance of the tumor could be obtained from the patient, who was a 33 year old white man admitted to the hospital for another complaint.

The case was interesting because of the unusual location of the tonsillar structure. The pathological examination revealed that this tissue closely resembled that in a tonsil. There was no recurrence of the growth.

ROENTGENOGRAPHIC INTERPRETATION IN ANTRUM SURGERY: REPORT OF CASES

Harold Boxer. J. Oral Surg. 12:329 Oct. 1954.

Four cases are presented to illustrate the three possibilities that exist when it is thought that a root fragment has been forced into the antrum. These possibilities are: (1) The fragment has been displaced into the antrum proper. (2) The fragment has been displaced within an enlarged socket. (3) The fragment has been displaced through the alveolar bone into the soft tissues.

Correct angulation in the roentgenographic study is the important factor in the preoperative diagnosis that determines which possibility actually exists, and several views at varying angles may be necessary.

MORPHOLOGIC CONSIDERATIONS OF PRIMARY TEETH IN DIAGNOSING RADIOGRAPHS

J. F. Mortell. J. Den. Children. 21:90 Second quarter, 1954.

Roentgenograms of the deciduous teeth have many diagnostic uses. Knowledge of what is considered normal for the growing child is important for accurate roentgenographic interpretation.

The use of roentgenographic diagnosis can be started comfortably on three year old children. At this stage the deciduous teeth have erupted, and the root ends are complete, except for those of the cuspid. The observable changes in the deciduous teeth after this age are the result of caries, attrition and progress toward exfoliation.

Roentgenographic diagnosis is the most accurate method for determining the interproximal caries experience of an individual. The distal surface of first deciduous molars and the mesial surface of second deciduous molars are the areas most susceptible to caries. The distal surfaces of the deciduous cuspids and mesial surface of first permanent molars are the next to show evidence of caries.

Roentgenograms may be used to advantage in determining the operating space in deciduous teeth, for observing loss of space following premature loss of deciduous molars and to determine the amount of adventitious secondary dentin present, which dentin causes a reduction in the size of the pulp chamber.

The gingival radiolucency observed in roentgenograms of deciduous molars can be eliminated by a 10 degree change in horizontal angulation.

Determination of the condition of the root ends of deciduous teeth is a difficult undertaking. Anterior root ends may be superimposed over the enamel epithelium of the developing permanent tooth or, as a result of rapid resorption, may resemble strongly a pathological radiolucency. The periodontal membrane space around deciduous molar roots may be difficult to determine because of superimposed structures, resorption and repair in response to injury. These factors result in roentgenographic irregularity of the periodontal membrane space. Pathological changes around deciduous molar roots usually show at the bifurcation as a loss in continuity of the lamina dura.

Deciduous teeth are eliminated by the progressive resorption of their roots by osteoclasts. The stimulus for the resorptive process comes partially from the erupting permanent tooth and partially (in the case of no permanent successor) from an unknown factor. The resorptive process usually begins on the surface of the root facing the permanent crown. Root fragments may remain unresorbed if they do not lie in the path of the erupting permanent bicuspid. Deviations from normal resorption may be due to delayed development, absence, or malposition of the permanent tooth and death of the pulp of the deciduous tooth. The etiology of resorption of deciduous roots may be a normal aging change or may be pathological resorption from metabolic disturbances, trauma, or infection from pulp canal of the tooth or adjacent teeth.

Submergence of deciduous teeth is thought to result from ankylosis. A fusion of cementum and alveolar bone prevents eruption of the tooth, and the other teeth and alveolar process grow up around it.

The teeth and jaws reflect endocrinal dysfunction as do other parts of the skeleton. Any influence of dysfunctioning endocrines is almost entirely limited to the developmental period. The only postdevelopmental manifestation is internal and external resorption.

The disturbances to the dentition are rather specific for the various developmental diseases

such as the ectodermal dysplasias, achondroplasia, dentinogenesis imperfecta, and so on, and are manifested mainly by faulty dental structure or interferences with exfoliation and eruption.

Enamel hypoplasia is the most common manifestation of systemic disturbance. Where there is a lack of enamel formation, radiolucent areas show on the roentgenograms. Possible etiologic factors are rickets, hypoparathyroidism and fluorosis. Two thirds of the enamel hypoplasias develop in the first ten months after birth.

Radiation therapy in infants to the area of developing teeth may affect the dentition by arresting the development of the tooth germ, may cause dwarfing of the permanent teeth and may result in premature termination of calcification.

William F. Via, Jr.

ORTHOPSYCHIATRY: ITS PART IN PREVENTION OF CHILDHOOD DISEASES

O. B. Markey. J. Den. Children. 21:69 Second quarter, 1954.

Orthopsychiatry has become a primary force in understanding the child's mental life. Orthopsychiatry developed as it was learned that the cranky infant, the temperamental toddler, the child with good intelligence who fails in school and the withdrawn or impulsive adolescent need attention if the neurotic and psychotic disorders of adults are to be avoided. The pedodontist must join the other child specialists in the prevention of distortions in total growth and in the treatment of disorders arising from errors in early childhood training and family relationships.

The early level of character development is exclusively a taking-in process. The child develops through various stages from infancy through latency and adolescence. Full maturity is reached when young people marry and are ready to bring up their children for the children's sake rather than for the parents' sake.

Self-assured parents will find basic love situations, which they enjoy with each other and with their children, more important than disciplinary methods for the growth of their children. A wise mother will help a child mature because he should, not because he must.

Thumbsucking has been one of the most common problems confronting the child's dentist. It is thought that a child who sucks his thumb must need to do so and that forceful deprivation of the pleasure represents a high emotional price the personality will pay in some way sooner or later. When the child is old enough to want help for this habit, the dentist can help him recognize the meaning of it and encourage him with practical devices, but he cannot force his will on the child.

Empathy, which is not the same as sympathy, is the capacity of the physician or dentist to sense the attitude of the patient. Empathy helps to create an atmosphere in which the patient can cooperate in treatment. The overdependent child must be gradually weaned, not forced away from his fears. Children should have the opportunity of visiting the dentist and developing trust before painful procedures become necessary. The sooner the dentist establishes a relationship with the child in which the parent need not be present the sooner he can expect good emotional transference.

With regard to some of the methods used to relieve or suppress fear, it might be said that restraining devices will work for the timid child without reducing his fear; however, these methods will fail for the rebellious and resistive child and will only increase his fear. If a towel is used to suppress screaming, the fear of suffocation can be devastating. No doctor has the right to force his will on a child at such an emotional price.

The psychiatrist can help to enrich the dentist's psychiatric orientation and skills, but the best dental psychiatry will be practiced by the dentist and not by the psychiatrist.

William F. Via, Jr.

THE ORGANIC CONTENT OF "CHALKY" ENAMEL

Maurice V. Stack. Brit. D.J. 96:73 Feb. 16, 1954.

In ten samples, "chalky" material from enamel lesions which did not involve discoloration or loss of contour was found to contain 1½ to 2 per cent organic matter, or 3 to 4 times as much as adjacent sound enamel. About 2 per cent organic matter was present in pooled "chalky" enamel (0.25 Gm.) which was collected in smaller quantities and analyzed by wet-combustion with a dichromate-sulfuric acid reagent. The organic content of material having a similar appearance and consistency removed from the inner surface of enamel overhanging grossly carious dentin ranged from 4 to 7 per cent.

Deaths

Adcock, John B., Harriman, Tenn.; Atlanta-Southern Dental College, 1924; died September 20; aged 54.

Andrews, Stanley S., New York; College of Dentistry, New York University, 1933; died September 24; aged 44.

Archambeau, John N., Green Bay, Va.; died April 10; aged 77.

Balthaser, Jacob B., Erie, Pa.; School of Dentistry, University of Pennsylvania, 1913; died September 1; aged 68.

Banik, Melvin J., Sacramento, Calif.; School of Dentistry, University of Oregon, 1947; died in July.

Barnecut, Sidney J., Lock Haven, Pa.; School of Dentistry, University of Pittsburgh, 1932; died September 26; aged 45.

Berndt, Paul E., Bellville, Texas; Louisville College of Dentistry of Centre College, 1905; died April 13; aged 74.

Binkard, Hugh R., Cleveland; College of Dentistry, Western Reserve University, 1905; died August 19; aged 73.

Blackman, Edward D., Pitman, N. J.; School of Dentistry, University of Pennsylvania, 1916; died October 6; aged 60.

Borowitz, Herman D., Brooklyn; New York College of Dentistry, 1917; died July 13; aged 63.

Brandt, Roy O., Anaconda, Mont.; Dental School, Northwestern University, 1914; died July 1; aged 64.

Brodeen, Albin, Minneapolis; College of Dentistry, University of Minnesota, 1901; died May 17; aged 76.

Brown, H. Robert, Lewiston, Maine; died August 25; aged 76.

Brungard, Ralph E., Columbiana, Ohio; School of Dentistry, University of Pittsburgh, 1927; died July 7; aged 52.

Budge, Louis D., Montpelier, Idaho; Chicago College of Dental Surgery, Loyola University, 1927; died June 29; aged 56.

Buell, Charles K., Buffalo; School of Dentistry, University of Buffalo, 1896; died August 31; aged 84.

Bullis, Mark C., Washington, D. C.; Dental Department, George Washington University, 1905; died July 12; aged 79.

Burke, Samuel T., Winnetka, Ill.; American College of Dental Surgery, Chicago, 1889; died May 3; aged 89.

Burlingame, Frank S., Sturgis, Mich.; School of Dentistry, University of Buffalo, 1903; died October 4; aged 73.

Burns, Thomas E., Somerville, Mass.; Dental School, Tufts College, 1930; died January 30, 1954; aged 47.

Burton, Marvin, Richmond, Va.; School of Dentistry, Washington University, St. Louis, 1913; died June 5; aged 72.

Busby, Lawrence P. Jr., Memphis, Tenn.; College of Dentistry, University of Tennessee, 1915; died October 9; aged 62.

Caldwell, William E. H., Wheeling, W. Va.; Dental School, Northwestern University, 1902; died October 2; aged 76.

Chandler, Asa M., Philadelphia; School of Dentistry, University of Pennsylvania, 1904; died September 21; aged 75.

Comeau, Harry A., Monterey Park, Calif.; College of Dentistry, University of Southern California, 1925; died September 22; aged 68.

Compton, Gurney L., Whittier, Calif.; College of Dentistry, Ohio Medical University, 1905; died September 7; aged 72.

Coulter, Melville R., Mankato, Minn.; College of Dentistry, University of Minnesota, 1909; died August 18; aged 73.

Cudmore, Edward F., Fairfield, Conn.; died August 20; aged 29.

Cunningham, Clell I., Oklahoma City; Kansas City Dental College, 1919; died January 1, 1954; aged 65.

Danforth, George H., Lynn, Mass.; Dental School, Harvard University, 1936; died August 24; aged 41.

Davidson, Marshall P., Bozeman, Mont.; Kansas City Dental College, 1896; died June 12; aged 88.

Davis, James A., Hammond, Ind.; Indiana Dental College, 1903; died May 24; aged 71.

Davis, Kenneth M., Upper Sandusky, Ohio; College of Dentistry, Ohio State University, 1931; died August 14; aged 47.

Douglas, James K., Sandusky, Ohio; College of Dental Surgery, University of Michigan, 1894; died October 4; aged 85.

Duncan, Harold W., Logansport, Ind.; Indiana Dental College, 1928; died July 28; aged 53.

Epling, William C., Princeton, W. Va.; Louisville College of Dentistry of Centre College, 1914; died September 11; aged 65.

Erickson, William A., Minneapolis; College of Dentistry, University of Minnesota, 1931; died April 18; aged 48.

Erpelding, Donald H., Detroit; College of Dental Surgery, University of Michigan, 1923; died May 23; aged 58.

Feeger, Albert J., Elkhart, Ind.; Indiana Dental College, 1921; died August 18; aged 64.

Fiebig, Henry C., Grand Rapids, Mich.; College of Dental Surgery, University of Michigan, 1897; died September 12; aged 86.

Freedman, Joseph, Philadelphia; School of Dentistry, Temple University, 1934; died October 16; aged 43.

Freeman, David W., Camden, N. J.; Dental School, Temple University, 1931; died September 1; aged 46.

Frurip, Leland F., Kendallville, Ind.; Louisville College of Dentistry of Centre College, 1916; died June 28; aged 61.

Gautier, Leonides A., San Francisco; College of Dentistry, University of California, 1903; died July 24; aged 73.

Godfrey, Edward C., Dover, N. H.; School of Dentistry, University of Pennsylvania, 1909; died September 7; aged 67.

Hagebush, Willard L., Newman, Ill.; School of Dentistry, St. Louis University, 1934; died May 9; aged 43.

Hammat, Charles R., Columbus, Ohio; Ohio College of Dental Surgery, University of Cincinnati, 1900; died July 24; aged 77.

Hassenplug, Edward C., Milton, Pa.; School of Dentistry, University of Pittsburgh, 1929; died September 21; aged 52.

Hayward, Theodore K., Montclair, N. J.; School of Dentistry, University of Pennsylvania, 1905; died August 29; aged 73.

Henderson, Alfred H. Jr., Philadelphia; School of Dentistry, Temple University, 1898; died October 18.

Henegan, James F., New York; New York College of Dentistry, 1922; died September 26; aged 57.

Herring, Emory D., Bushnell, Ill.; Chicago College of Dental Surgery, Loyola University, 1910; died August 19; aged 68.

Hinshaw, John A., Royal Center, Ind.; School of Dentistry, Indiana University, 1927; died September 27; aged 52.

Hite, Ralph M., Mannington, W. Va.; Baltimore College of Dental Surgery, 1905; died September 9; aged 69.

Hyser, Charles L., New York; New York College of Dentistry, 1917; died October 15; aged 62.

Ingle, John J., Colville, Wash.; Dental School, Northwestern University, 1914; died August 26; aged 62.

Johnston, Bertram B., New Bethlehem, Pa.; Pittsburgh Dental College, Western University of Pennsylvania, 1908; died July 9; aged 71.

Kanary, Thomas P., Toledo, Ohio; School of Dentistry, St. Louis University, 1914; died August 6; aged 61.

Kemp, Lucius S., Ridgway, Colo.; School of Dentistry, University of Denver, 1917; died July 29; aged 76.

Kilpatrick, Andrew C., Montgomery, Ala.; Southern Dental College, Atlanta, 1896; died October 9; aged 86.

Kistler, Ralph G., New York; Medico-Chirurgical College of Philadelphia, 1907; died August 24.

Lambert, Alfred, Springfield, Ill.; School of Dentistry, Washington University, St. Louis, 1892; died August 18; aged 83.

Landry, Lawrence D., Baton Rouge, La.; New Orleans College of Dentistry, 1908; died August 6; aged 71.

Lavine, Bernard S., Trenton, N. J.; Baltimore College of Dental Surgery, University of Maryland, 1943; died September 10; aged 33.

Lee, Albert F., Boston; died June 18; aged 65.

Lindsay, Harley B., Charleston, S. C.; Dental Department, Baltimore Medical College, 1896; died September 8; aged 79.

Long, Conrad C., Palatka, Fla.; College of Dentistry, Howard University, 1929; died August 4; aged 51.

Martin, Chester A., Live Oaks, Fla.; Western Dental College, Kansas City, 1915; died July 7; aged 71.

Maxson, Frank T., Newark, N. J.; Baltimore College of Dental Surgery, 1911; died September 24; aged 64.

McDiarmid, William H. K., Pittsburgh; School of Dentistry, University of Pittsburgh, 1916; died October 4; aged 62.

McDonald, Leland E., Sherman Oaks, Calif.; College of Dentistry, University of Southern California, 1924; died September 25; aged 55.

McGuire, William B., Rochester, N. Y.; School of Dentistry, Georgetown University, 1936; died September 5; aged 50.

McKenney, Edgar J., Brooklyn; School of Dentistry, University of Buffalo, 1921; died October 6; aged 56.

McLaughlin, Harry A., Youngstown, Ohio; Ohio College of Dental Surgery, University of Cincinnati, 1908; died October 7; aged 69.

Mercer, William C., Williamston, N. C.; Atlanta-Southern Dental College, 1918; died July 25.

Meyer, Arthur C., Chicago; College of Dentistry, University of Illinois, 1912; died September 19; aged 68.

Miller, August, Portland; School of Dentistry, North Pacific College of Oregon, Portland, 1919; died in May; aged 63.

Milligan, Arthur E., Indianapolis; died April 9; aged 76.

Monson, Harvey M., Moorhead, Minn.; College of Dentistry, University of Minnesota, 1934; died August 8; aged 48.

Mulcahy, Vincent A., Faribault, Minn.; College of Dentistry, Creighton University, 1926; died August 2; aged 48.

O'Connor, Sarsfield J., Syracuse, N. Y.; School of Dentistry, University of Buffalo, 1919; died September 1; aged 55.

Onizuka, Katsujiro, Stockton, Calif.; College Physicians and Surgeons, San Francisco, 1922; died October 6; aged 70.

Ott, Azel J., Tallahassee, Fla.; School of Dentistry, Tulane University, 1927; died September 23; aged 50.

Parramore, Tyson E., Citra, Fla.; Atlanta-Southern Dental College, 1925; died August 18; aged 56.

Patterson, Harry L., Creal Springs, Ill.; died August 13; aged 66.

Peoples, John W., Petaluma, Calif.; College of Dentistry, University of California, 1902; died September 22; aged 74.

Phillips, William H., Bath, N. Y.; Baltimore College of Dental Surgery, 1888; died April 1; aged 91.

Rennie, Arthur L., Chicago; Chicago College of Dental Surgery, Loyola University, 1909; died September 2; aged 69.

Robison, Fred A., State College, Pa.; Pittsburgh Dental College, Western University of Pennsylvania, 1900; died August 11; aged 78.

Romanow, Morris T., Boston; died July 27; aged 75.

Ruge, Henry W., Chesterton, Ind.; Chicago College of Dental Surgery, Loyola University, 1900; died August 18; aged 74.

Ruthven, Stanley R., Detroit; College of Dental Surgery, University of Michigan, 1912; died June 10; aged 62.

Santaniello, Joseph S., Philadelphia; School of Dentistry, University of Pennsylvania, 1946; died August 24; aged 32.

Sauerbrun, Leo T., Warren, Ohio; College of Dental Surgery, University of Michigan, 1901; died July 10; aged 75.

Saunders, Lindsey P., Pawnee, Okla.; Southeastern Dental University, Atlanta, 1913; died February 4.

Schacher, Harry P., New York; College of Dental and Oral Surgery, New York, 1917; died September 22; aged 59.

Schiff, Herman S., New York; College of Dental and Oral Surgery, New York, 1922; died September 3.

Schreiber, George J., New York; New York College of Dentistry, 1886; died August 31; aged 90.

Scott, Jay D., Kansas City, Mo.; Kansas City-Western Dental College, 1925; died August 22; aged 55.

Schuldt, Uhle A., Minneapolis; College of Dentistry, University of Minnesota, 1921; died May 15; aged 58.

Schwab, William A., Elmhurst, Ill.; Dental School, Northwestern University, 1918; died May 10.

Segars, Charles G., Troy, Ala.; Southern Dental College, Atlanta, 1912; died August 4; aged 66.

Shannon, Henry A., Lincoln, Neb.; Chicago College of Dental Surgery, Loyola University, 1898; died June 25.

Sheppard, Freeman A., Detroit; Dental Department, Meharry Medical College, 1943; died August 30; aged 36.

Shortell, Ed J., Miami, Fla.; Baltimore College of Dental Surgery, University of Maryland, 1909; died September 5.

Shutts, Edward F., Norwalk, Ohio; College of Dental Surgery, University of Michigan, 1929; died September 4; aged 48.

Sims, Fred E., Tulsa, Okla.; died July 9; aged 77.

Slade, Arthur R., Vineland, N. J.; School of Dentistry, University of Pennsylvania, 1901; died October 18; aged 74.

Smith, Frank D., Eureka, Calif.; College of Dentistry, University of California, 1924; died September 5; aged 55.

Smith, J. Robert, San Diego; Dental School, Northwestern University, 1922; died August 21; aged 54.

Smith, William A., Masontown, W. Va.; Cincinnati College of Dental Surgery, 1915; died August 26; aged 69.

Spector, Leonard A., Brooklyn; School of Dentistry, University of Pennsylvania, 1943; died May 30; aged 34.

Stewart, Frank P., Indiana, Pa.; School of Dentistry, University of Pittsburgh, 1928; died July 1; aged 50.

Sutch, Creston, Glenside, Pa.; School of Dentistry, University of Pennsylvania, 1915; died October 3; aged 60.

Sutphen, John W., New York; New York College of Dentistry, 1911; died August 4; aged 66.

Swartzendruber, Joseph R., Kalona, Iowa; College of Dentistry, University of Iowa, 1907; died July 6; aged 70.

Tellez, Albert C., Los Angeles; College of Dentistry, University of Southern California, 1924; died October 22; aged 57.

Traylor, Floyd W., Boonville, Ind.; Indiana Dental College, 1904; died September 8; aged 72.

Taylor, William J., Avoca, N. Y.; New York College of Dentistry, 1888; died August 8; aged 94.

Townsend, William J., West Haven, Conn.; School of Dentistry, University of Pittsburgh, 1927; died July 30; aged 49.

Treece, Carlyle A., Galesburg, Ill.; Chicago College of Dental Surgery, Loyola University, 1931; died August 19.

Trestain, Charles W., Battle Creek, Mich.; Department of Dental Surgery, Detroit College of Medicine, 1899; died July 25; aged 78.

Troutman, Paul W., Hickory, N. C.; Southern Dental College, Atlanta, 1908; died July 13; aged 72.

Troxler, Edward A., Greensboro, N. C.; Baltimore College of Dental Surgery, University of Maryland, 1913; died July 28; aged 66.

Turner, Floy A., Hanford, Calif.; College of Physicians and Surgeons, San Francisco, 1933; died July 17.

Tuttle, David M., Gastonia, N. C.; Atlanta-Southern Dental College, 1940; died September 19; aged 37.

Ulvestad, Edwin E., Hanska, Minn.; College of Dentistry, University of Minnesota, 1926; died July 6; aged 59.

Vines, Walter E., Buffalo; School of Dentistry, University of Pennsylvania, 1912; died August 22; aged 81.

Walker, Richard H., Redding, Calif.; College of Physicians and Surgeons, San Francisco, 1928; died July 30; aged 54.

Wallace, Archie B., Sharon, Pa.; College of Dentistry, Western Reserve University, 1901; died August 13; aged 75.

Ward, Roscoe E., Port Chester, N. Y.; College of Dentistry, Howard University, 1923; died August 11; aged 59.

Webber, Percy A., Sacramento, Calif.; College of Dentistry, University of California, 1906; died September 1; aged 75.

Weight, George E., Wichita, Kan.; Kansas City Dental College, 1919; died September 3; aged 67.

Weinstein, Jules H., New York; New York College of Dentistry, 1924; died July 26; aged 53.

Welch, Harold W., Chicago; School of Dentistry, University of Louisville, 1918; died August 23; aged 62.

Wells, Floyd N., West Point, Neb.; College of Dentistry, Creighton University, 1908; died May 13; aged 78.

Wertzler, Charles F., Chicago; College of Dentistry, University of Illinois, 1904; died July 31; aged 82.

Whitley, Clifford W., Harrisburg, Ill.; Chicago College of Dental Surgery, Loyola University, 1910; died August 26; aged 66.

Whitten, Frank E., Waltham, Mass.; died July 7.

Wiese, Charles A., Lake City, Iowa; Dental School, Northwestern University, 1904; died June 10; aged 77.

Wilkinson, Harry E., New London, Minn.; College of Dentistry, University of Minnesota, 1923; died June 20; aged 59.

Williams, Arnette P., Tuskegee, Ala.; School of Dentistry, Vanderbilt University, 1907; died July 31; aged 70.

Williams, Daniel B., Wilkes-Barre, Pa.; Baltimore College of Dental Surgery, 1894; died July 30; aged 82.

Williams, Ellsworth, Lafayette, Ind.; Ohio College of Dental Surgery, University of Cincinnati, 1892; died June 3; aged 92.

Williams, Ross P., Pittsburgh; School of Dentistry, University of Pittsburgh, 1913; died September 30; aged 63.

Wilson, Lyman A., New York; died July 21; aged 67.

Wilson, Odie L., Kinston, N. C.; died June 1; aged 79.

Wilson, William I., Laredo, Texas; Texas Dental College, Houston, 1911; died May 29; aged 67.

Witty, Russell T., Bovill, Idaho; St. Louis Dental College, 1907; died August 20; aged 70.

Woods, Frank R., Avon, Ill.; Dental School, Northwestern University, 1910; died June 20; aged 75.

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Announcements

MEETINGS OF THE AMERICAN DENTAL ASSOCIATION

Ninety-Sixth Annual Session	Oct. 17-20, 1955	San Francisco
Ninety-Seventh Annual Session	Oct. 1-4, 1956	Atlantic City, N.J.
Ninety-Eighth Annual Session		Miami, Fla.
Ninety-Ninth Annual Session		Dallas, Texas
One-Hundredth Annual Session		New York

MEETINGS OF CONSTITUENT SOCIETIES

State	Date	Place	Secretary	Address
Alabama	Apr. 4, 5	Birmingham	F. A. Finney, Jr.	1045 Forrest Ave., Gadsden
Alaska			R. M. MacKenzie	Alaska Native Service, Juneau
Arizona	Apr. 27-30	Grand Canyon	R. W. Christensen	17 E. Weldon Ave., Phoenix
Arkansas	Apr. 3-6	Little Rock	D. M. Hamm	Box 89, Clarksville
California	Apr. 16	San Francisco	L. R. Ludwigsen	450 Sutter St., San Francisco
S. California	May 9-11	Los Angeles	J. P. Bowers	124 W. Lime Ave., Monrovia
Colorado	Oct. 2-5	Colorado Springs	W. R. Humphrey	724 Republic Bldg., Denver
Connecticut	May 18-20	Hartford	E. S. Arnold	37 Linnard Rd., W. Hartford
Delaware	Jan. 12	Wilmington	R. J. Zurkow	152 S. State St., Dover
District of Columbia	June 14	Washington	Z. B. Lloyd	2007 R St., N.W., Washington
Florida	Apr. 24-27	Jacksonville	J. E. Edwards	152 Alhambra Circle, Coral Gables
Georgia	Oct. 2-5	Atlanta	J. W. Yarbrough	Bibb Bldg., Macon
Hawaii	June 15-18	Honolulu	J. H. Dawe	810 N. Vineyard St., Honolulu
Idaho	May 19-21	Coeur d'Alene	F. O'Halloran	Box 703, Coeur d'Alene
Illinois	May 9-12	Peoria	P. W. Clopper	623 Jefferson Bldg., Peoria
Indiana	May 16-18	Indianapolis	D. C. Barnhill	400 Bankers Trust Bldg., Indianapolis
Iowa	May 1-4	Des Moines	H. I. Wilson	639 Insurance Exchange Bldg., Des Moines
Kansas	May 15-18	Kansas City, Mo.	F. A. Richmond	861 Brotherhood Bldg., Kansas City
Kentucky	Apr. 18-21	Louisville	A. B. Coxwell, Jr.	1976 Douglass Blvd., Louisville
Louisiana	Apr. 13-16	New Orleans	J. S. Bernhard	2515 Line Ave., Shreveport
Maine	June 23-25	Rockland	S. M. Gower	Box 27, Skowhegan
Maryland	May 2-4	Baltimore	E. L. Pessagno, Jr.	415 Medical Arts Bldg., Baltimore
Massachusetts	May 1-4	Boston	H. E. Tingley	12 Bay State Rd., Boston
Michigan	Apr. 18-20	Detroit	F. Wertheimer	Michigan Dept. of Health, Lansing
Minnesota	Mar. 28-30	Minneapolis	C. V. E. Cassel	225 Hamm Bldg., St. Paul
Mississippi	Apr. 24-27	Jackson	B. A. Cohen	306 Plaza Bldg., Jackson
Missouri	May 15-18	Kansas City	E. D. Sugget	201 Merchants Bank Bldg., Jefferson City
Montana	May 5-7	Bozeman	E. G. Vedova	Roundup
Nebraska	May 9-12	Lincoln	F. A. Pierson	1112 Federal Securities Bldg., Lincoln
Nevada	June 10-12	Lake Tahoe	O. M. Seifert	506 Humboldt St., Reno
New Hampshire	June 12-14	Whitefield	F. E. Williams	814 Elm St., Manchester
New Jersey	Apr. 18-20	Atlantic City	J. G. Carr	407 Cooper St., Camden
New Mexico	May 22-25	Ruidoso	J. S. Ellar	Medical Arts Square, Albuquerque
New York	May 16-18	New York	C. A. Wilkie	1 Hanson Place, Brooklyn
North Carolina	May 15-18	Pinehurst	R. D. Coffey	Kibler Bldg., Morganton
North Dakota	May 1-4	Grand Forks	V. B. Keltgen	517 de Lendrecie Bldg., Fargo
Ohio	Nov. 13-16	Cleveland	E. G. Jones	185 E. State St., Columbus
Oklahoma	Apr. 20	Tulsa	S. A. Russman	809 Medical Arts Bldg., Oklahoma City
Oregon	Mar. 7-9	Portland	T. D. Holder	308 Selling Bldg., Portland
Panama Canal Zone			A. L. Teitel	Box D, U.S. Naval Station, Rodman
Pennsylvania	May 16-18	Philadelphia	M. D. Zimmerman	217 State St., Harrisburg
Puerto Rico	Jan. 26-29	San Juan		Box 624, San Juan
Rhode Island	Jan.	Providence	B. C. Friedman	2 Ayrault St., Newport
South Carolina	May 22-24	Charleston	J. R. Owings	7 Medical Court, Greenville

State	Date	Place	Secretary	Address
South Dakota	May 15-17	Aberdeen	L. N. Thelen	310A W. 18th St., Sioux Falls
Tennessee	May 8-12	Nashville	A. M. Ballentine	Pulaski
Texas	May 1-5	San Antonio	W. Ogle	3607 Gaston Ave., Dallas
Utah	Apr. 21-23	Ogden	R. C. Dalgleish	124 State Capitol Bldg., Salt Lake City
Vermont	May 30-June 1	Manchester	W. J. Reardon	18 Madison St., Rutland
Virginia	Apr. 29-May 6	Havana, Cuba	W. T. McAfee	705 Colonial National Bank Bldg., Roanoke
Washington	Mar. 24-26	Seattle	W. B. Martin	Medical-Dental Bldg., Seattle
West Virginia	July 24-27	White Sulphur Springs	G. N. Casto, Jr.	710½ Lee St., Charleston
Wisconsin	Apr. 25-27	Milwaukee	A. E. Kopp	Wells Bldg., Milwaukee
Wyoming	June 16-18	Cheyenne	T. J. Drew	State Office Bldg., Cheyenne

MEETINGS OF STATE BOARDS OF DENTAL EXAMINERS

State	Date	Place	Secretary	Address
Alabama	June 20-24* June 20, 21†	Birmingham	W. L. McCarty	200 Professional Center, Montgomery
Alaska			R. H. Williams	Box 2122, Juneau
Arizona			R. K. Trueblood	107 East A Ave., Glendale
Arkansas	June 20-24*†	Little Rock	H. O. Weatherly	205 Halter Bldg., Conway
California	Feb. 7 June 20 July 25	San Francisco Los Angeles San Francisco	T. E. Tilden	Medico-Dental Bldg., Sacramento
Colorado			J. M. Peabody	724 Republic Bldg., Denver
Connecticut		New York	C. G. Brooks	302 State St., New London
Delaware			P. K. Musselman	143 W. Main St., Newark
District of Columbia			W. T. Birthright	Suite 718, 1835 Eye St., N.W. Washington
Florida	July 11-21*†	Jacksonville	A. W. Kellner	P. O. Box 155, Hollywood
Georgia			P. M. McNeil	307 First National Bank Bldg., Rome
Hawaii	Feb. 17-20	Honolulu	H. L. Houvener	427 Dillingham Bldg., Honolulu
Idaho			R. E. Blickenstaff	1023 Fourth St., S., Nampa
Illinois			W. A. McKee	503 Wood Bldg., Benton
Indiana			C. A. Frech	504 Broadway, Gary
Iowa	May 23-27‡		D. J. FitzGerald	615 Brick & Tile Bldg., Mason City
Kansas	Jan. 24-27* Jan. 25, 26†	Kansas City, Mo.	G. L. Teall	Box 71, Hiawatha
Kentucky			R. M. Justice	1330 Central Ave., Ashland
Louisiana	June 5-10	New Orleans	R. C. Steib	833 Maison Blanche Bldg., New Orleans
Maine			R. A. Derbyshire	Box 387, Skowhegan
Maryland	June 6-8‡		H. Levin	3429 Park Heights Ave., Baltimore
Massachusetts	June 13-16*† June 15, 16†‡		G. J. Fink	Rm. 33, State House, Boston
Michigan	Jan. 23-29 June 5-11	Ann Arbor	J. L. Champagne	3714 W. McNichols Rd., Detroit
Minnesota	Jan. 10-14*†‡ June 13-17†‡		M. G. Walls	615 Montcalm Place, St. Paul
Mississippi	Jan. 4-6 June 21-23	Jackson	J. C. Boswell	508 Lamar Life Bldg., Jackson
Missouri			R. R. Rhoades	414 Central Trust Bldg., Jefferson City
Montana			V. J. Quinn	301 Phoenix Bldg., Butte
Nebraska			H. E. Weber	1210 Federal Securities Bldg., Lincoln
Nevada			R. Whitehead	Suite 6, Masonic Temple, Reno
New Hampshire			S. G. Markos	8 Renaud Ave., Dover
New Jersey	May 25, 26* June 1, 2* June 8, 9*† June 13, 14*	Washington, D.C. Philadelphia New York Trenton	W. A. Wilson	150 E. State St., Trenton
New Mexico			J. J. Clarke, Sr.	Artesia
New York	Feb. 10, 11*‡ Feb. 15-18*‡ Feb. 10†‡ Feb. 15, 16†‡		D. W. Beier	23 S. Pearl St., Albany
North Carolina			F. O. Alford	1109 Liberty Life Bldg., Charlotte
North Dakota	June 20-24	Fargo	A. L. Pushor	Lisbon
Ohio			H. B. Smith	322 E. State St., Columbus
Oklahoma			R. P. Keidel	403 Surety Bldg., Muskogee
Oregon			F. L. Utter	506 Pioneer Trust Bldg., Salem
Pennsylvania	June 20-25 June 20-22	Philadelphia Pittsburgh	A. M. Stinson	Dept. of Public Instruction, Box 911, Harrisburg

State	Date	Place	Secretary	Address
Puerto Rico			J. Mercado C.	Box 3717, Santurce
Rhode Island			F. M. Hackett	267 Academy Ave., Providence
South Carolina	Jan. 27-29	Columbia	T. C. Sparks	1315 Pickens St., Columbia
South Dakota	Jan. 9-12	Sioux Falls	H. T. Aker	Canton
Tennessee			C. R. Aita	619 Bennie Dillon Bldg., Nashville
Texas			R. T. Weber	312 Capital National Bank Bldg., Austin
Utah			D. L. Folsom	1101 First Security Bank Bldg., Salt Lake City
Vermont			P. M. Fitch	Newport
Virginia	June 6-11* June 6, 7†	Richmond	J. M. Hughes	715 Medical Arts Bldg., Richmond
Washington			M. L. Mower	National Bank of Commerce Bldg., Olympia
West Virginia			C. A. Laughlin	613 Prunty Bldg., Clarksburg
Wisconsin	June 13-17*†	Milwaukee	S. F. Donovan	Tomah
Wyoming			W. A. Hocker	212 O & S Bldg., Casper

Most states require applications to be in 30 days prior to examination date.
*Dental examination. †Dental hygiene examination. ‡Write to secretary of dental examining board for information on locations of examinations. §Approximate dates—verify with state dental examining board.

MEETINGS OF OTHER ORGANIZATIONS

Name	Date	Place	Secy. or Chm.	Address
Academy of Denture Prosthetics	May 8	New York	I. L. Furnas Secy.	928 Silverado St., La Jolla, Calif.
American Academy of Dental Medicine	May 13-15	New York	W. M. Greenhut Secy.	124 E. 84th St., New York
American Academy of Implant Dentures	Feb. 4, 5	Chicago	P. S. Loechler Secy.	1924 Thomas Lane, Augusta, Ga.
American Academy of Restorative Dentistry	Feb. 5, 6	Chicago	A. G. James Secy.	409 N. Camden Drive, Beverly Hills, Calif.
American Association of Dental Schools	Mar. 21-23	Chicago	M. W. McCrea Secy.	Baltimore College of Dental Surgery, University of Maryland, Baltimore
American Association of Endodontists	Feb. 5, 6	Chicago	V. B. Milas Secy.	2559 W. 63rd St., Chicago
American Association of Industrial Dentists	Apr. 26-28	Buffalo	E. R. Aston Secy.	South Office Bldg., Harrisburg, Pa.
American Denture Society	Feb. 4, 5	Chicago	A. L. Roberts Secy.	4 Main St., Aurora, Ill.
Chicago Dental Society	Feb. 6-9	Chicago	K. S. Richardson Exec. Secy.	30 N. Michigan Ave., Chicago
Cincinnati Dental Society Clinic	Mar. 27-29	Cincinnati	W. C. Jolly Secy.	403 Tracton Bldg., Cincinnati
Council on Dental Education, Dental Aptitude Tests	Apr. 29, 30		S. Peterson Secy.	222 E. Superior St., Chicago
Dallas Mid-Winter Dental Clinic	Jan. 30-Feb. 2	Dallas, Texas	J. E. Myers Chm.	2518 Welborn, Dallas, Texas
Denver Dental Association Midwinter Meeting	Jan. 9-12	Denver	B. Kletzky Secy.	724 Republic Bldg., Denver
District of Columbia Postgraduate Clinic	Mar. 13-16	Washington, D.C.	E. M. Colvin, Jr. Gen. Chm.	1726 21st St., N.W., Washington, D.C.
Federation Dentaire Internationale	Aug. 14-20	Copenhagen, Denmark	G. H. Leatherman Secy. Gen.	35 Devonshire Place, London, England
Greater Philadelphia Annual Meeting	Feb. 2-5	Philadelphia	R. Adams Secy.	337 Bellevue-Stratford Hotel, Broad and Walnut Sts., Philadelphia
International Association for Dental Research	Mar. 18-20	Chicago	E. H. Hatton Secy.	2419 Simpson St., Evanston, Ill.
National Board of Dental Examiners	Mar. 28, 29		G. J. Casey Secy.	222 E. Superior St., Chicago
Northeastern Society of Orthodontists	Mar. 7, 8	New York	W. J. Prezzano Secy.	Medical Centre, White Plains, N.Y.
Seminario Anual del Grupo de Estudios Dentales U. S. C. De Mexico	May 15-19	Tehuacan, Puebla, Mex.	R. S. deLascurain Secy.	Insurgentes 257-10, Mexico, D.F.
Sixth Annual Berkshire Conference	June 19-23	Lenox, Mass.	I. Glickman Dir.	Tufts College Dental School, 136 Harrison Ave., Boston
Southern Academy of Oral Surgery	Mar. 19, 20	Chattanooga Tenn.	R. F. Sullivan Secy.	118 Jones St., E., Savannah, Ga.

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$200.00	3,000.00	10,000.00	30.15	34.65	43.65	50.65
$300.00	3,000.00	15,000.00	44.25	51.00	64.50	75.00
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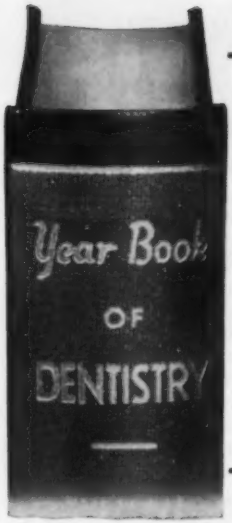

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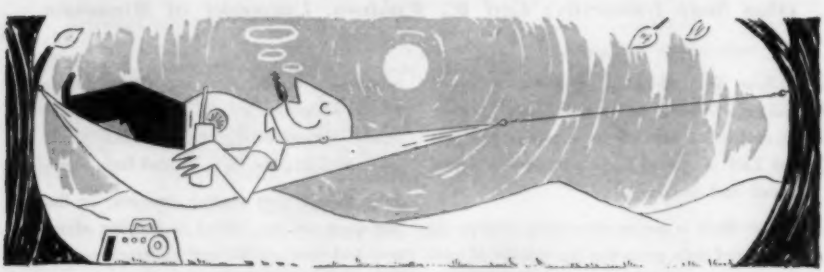

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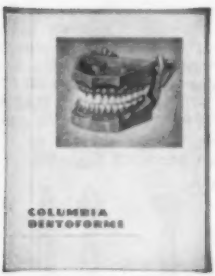

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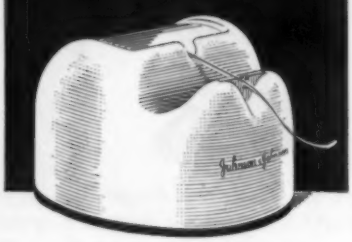

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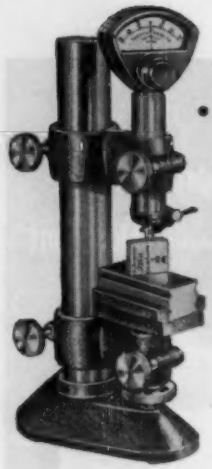

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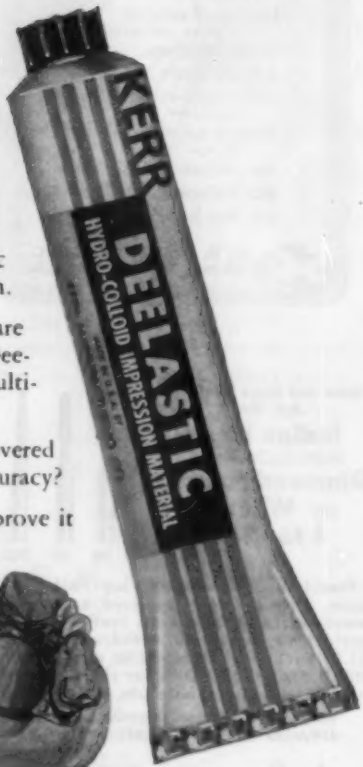

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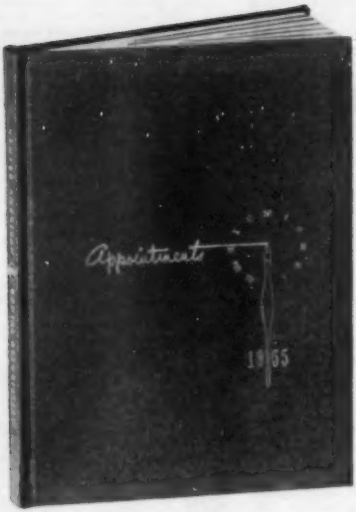

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Piston.

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Side of cage.

Flask splits here. Notice how perfectly closed — metal to metal contact.

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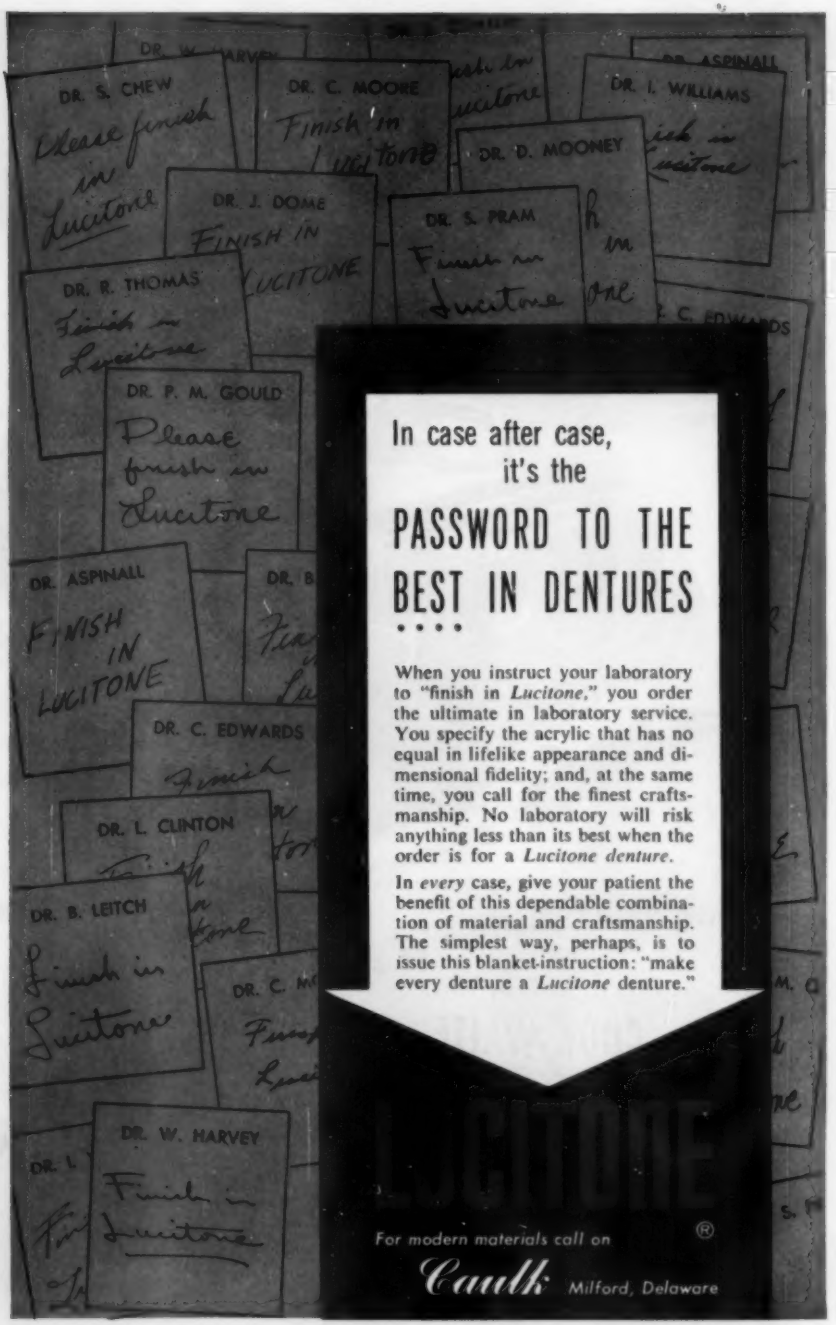

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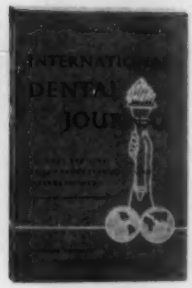

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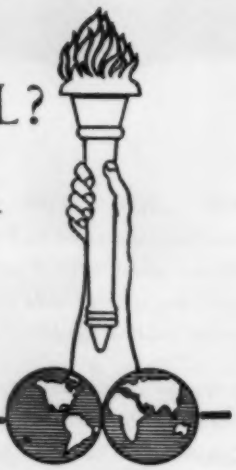

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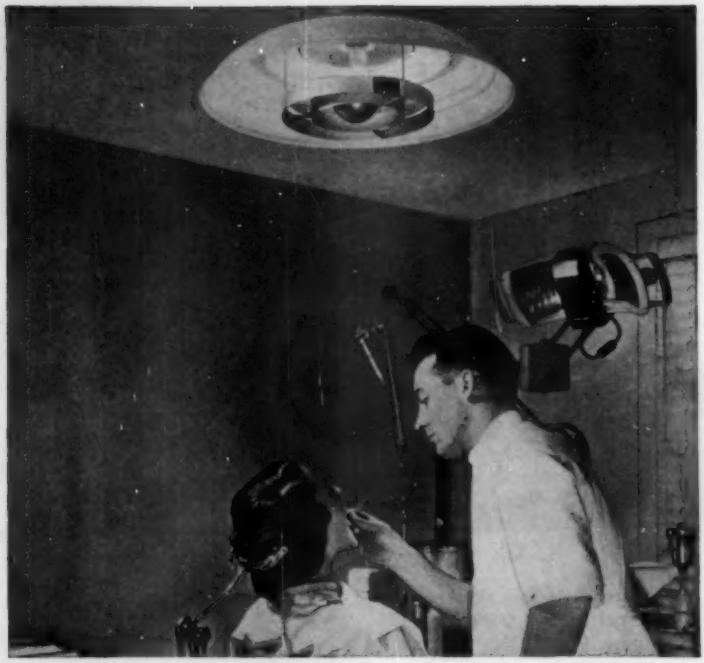

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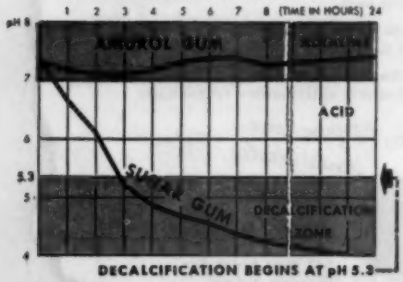

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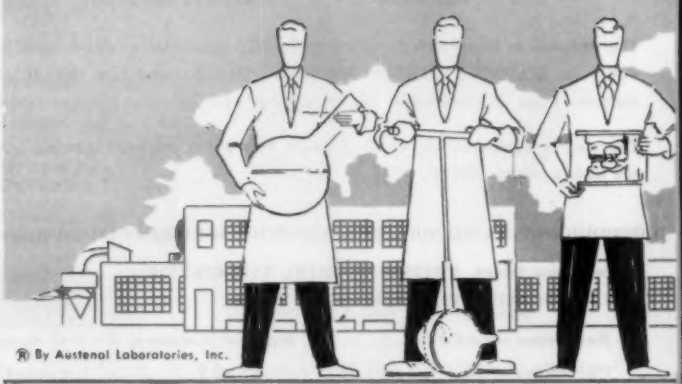

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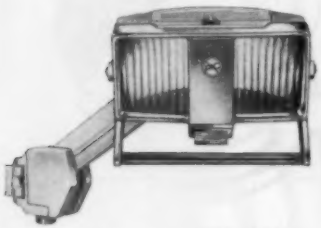

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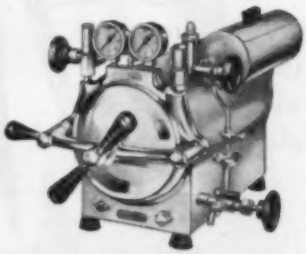

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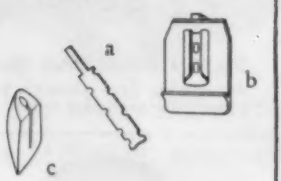

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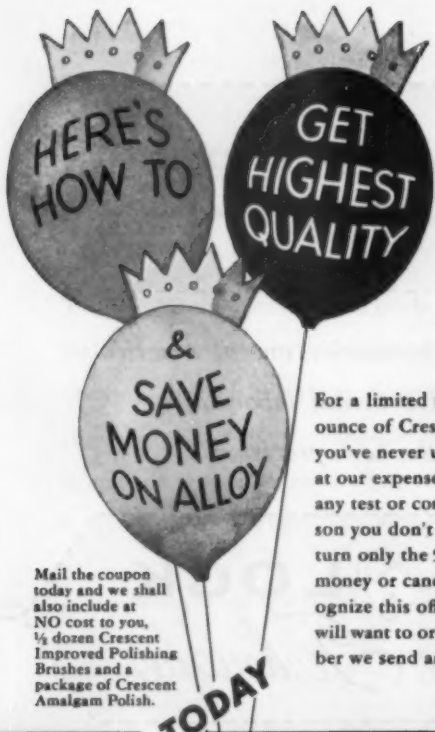

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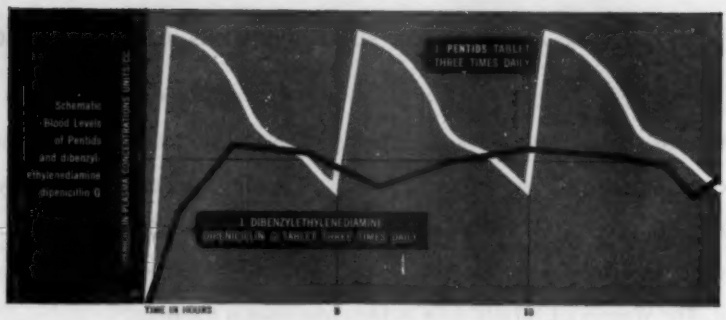
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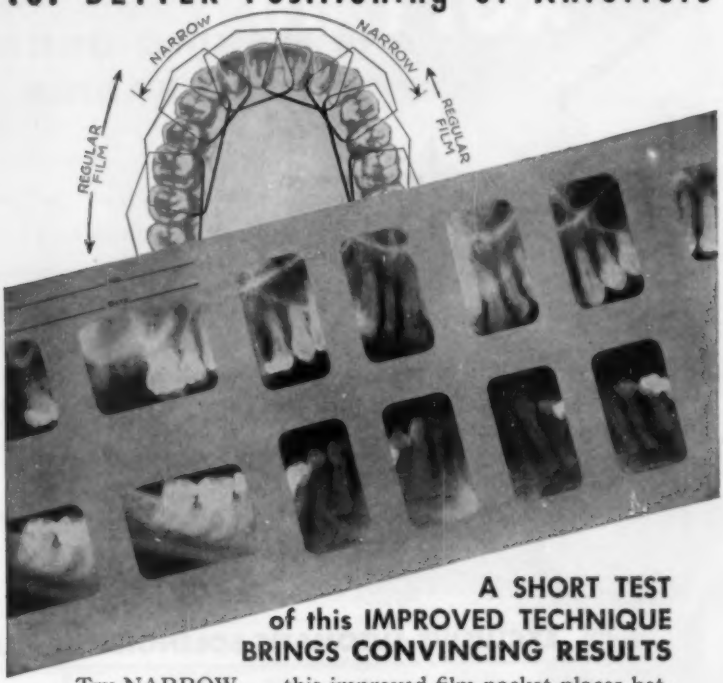

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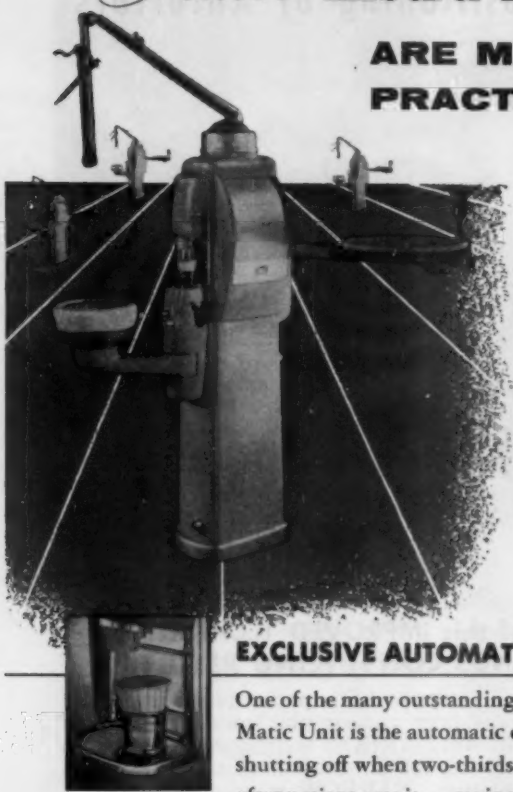

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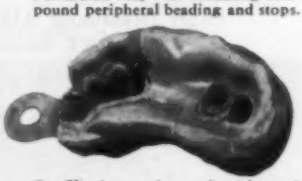

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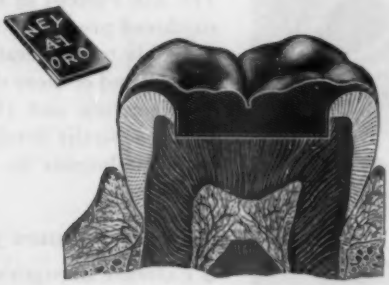

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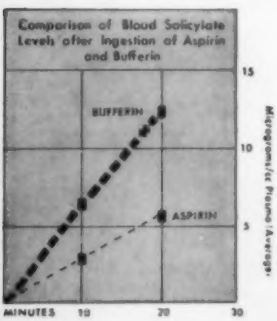

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